

**AN ILLUSTRATED INFORMATION
LEAFLET FOR LOW-LITERATE
HIV/AIDS PATIENTS ON
ANTIRETROVIRAL THERAPY:
DESIGN, DEVELOPMENT AND
EVALUATION**

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By

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ABSTRACT

South Africa's HIV prevalence rate is estimated to be 5.7 million and at the end of 2007 a total of 45 845 HIV/AIDS adult patients were taking antiretroviral therapy (ART). The global incidence of HIV/AIDS has been slowly decreasing over the years but is still widespread. This disease is still more prevalent in sub-Saharan Africa than in other parts of the world, with more than 60% people living with HIV/AIDS. Highly active antiretroviral therapy (HAART), the treatment of choice, slows the progression of the human immunovirus but demands a high adherence rate in excess of 95%. Patients who are poorly informed about antiretrovirals (ARVs) and misunderstand medicine-taking instructions or experience unexpected side effects may interrupt therapy, predisposing them to the development of resistance. Such patients need information but, given the poor literacy skills prevalent in South Africa, written information is often not fully comprehended and is often written at too high a reading level.

The objectives of this research project were to design, modify and evaluate HIV/AIDS patient education materials for low-literate isiXhosa speaking adults residing in Grahamstown and to examine their impact on the understanding of various aspects of the disease and its treatment. Pictograms illustrating common side effects of ARVs (e.g. stavudine, efavirenz, lamivudine), as well as various sources for purchasing non-prescription medicines, storage and medicine-taking instructions were designed and evaluated both qualitatively, using group discussions, and quantitatively through individual interviews where interpretation of the pictograms was assessed. These pictograms were incorporated in a patient information leaflet (PIL) which had been specifically designed for people with limited reading skills and was a simple document containing the minimum of essential text.

A previously developed PIL was modified in collaboration with the target population and two versions were produced, one incorporating pictograms illustrating side effects, the other with none. Pictograms were used in both to illustrate other medicine-taking instructions. The PILs were tested objectively to assess the readability, format, content, and general design. They were translated into isiXhosa prior to being qualitatively and quantitatively evaluated in a low-literate isiXhosa speaking population. Understanding

of the PILs was assessed by asking a series of questions about the PIL content. Participant opinion of the readability and appearance of the PIL was recorded. The relationship between PIL understanding and selected demographic variables was investigated.

Findings from this study illustrated that well designed pictograms assist in the location of information in written leaflets and they may enhance understanding of the information. It was further demonstrated that education influences total understanding of PIL content thus emphasizing the need for tailor-written information in accordance with the education level of the target population. A desire to receive PILs incorporating pictograms was expressed by the majority of participants.

Collaboration with the intended target population is essential to design culturally acceptable, easily interpreted pictograms and to produce user-friendly, easy-to-read, comprehensible patient education materials. The rigorous, iterative design, modification and testing process described in this study is one that should be adopted in producing all health-related education materials.

“I remember my mother's prayers and they have always followed me.
They have clung to me all my life...”

Abraham Lincoln

This work is dedicated to my beloved mother...

Ms Sibongile Doris Malinga

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*Make your own notes.
NEVER underline or
write in a book.*

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LIST OF ACRONYMS

ABC:	Abacavir
AIDS:	Acquired Immunodeficiency Syndrome
ADR:	Adverse drug reaction
ART:	Antiretroviral therapy
ARVs:	Antiretroviral drugs
ASL:	Average sentence length
ASW:	Average syllables per word
AZT:	Zidovudine
ddC:	Zalcitabine
ddI:	Didanosine
DLV:	Delavirdine
DNA:	Deoxyribonucleic acid
EDL:	Essential drug list
EFA:	Education For All
EFV:	Efavirenz
ELISA:	Enzyme linked immunosorbant assay
FDA:	Food and Drug Administration
FTC:	Emtracitabine
GL:	Grade level
GRID:	Gay related immune disease
HAART:	Highly Active Antiretroviral Therapy
HCP:	Healthcare Provider
HIV/AIDS:	HIV and AIDS
HIV:	Human Immunodeficiency Virus
HL:	Health Literacy
HP 2010:	Healthy People 2010
MCC:	Medicines Control Council (South Africa)
MEDUNSA:	Medical University of South Africa
MEMS:	Medication Electronic Monitoring Systems
MIDAS:	Medication Information Design Assessment Scale
NADEMC:	National Adverse Drug Event Monitoring Centre
NNRTIs:	Non-nucleoside Reverse Transcriptase Inhibitors
NRTIs:	Nucleoside Reverse Transcriptase Inhibitors
NVP:	Nevirapine
OTC:	Over-the-counter
d4T:	Stavudine
PCP:	Pneumocytis Carinii Pneumonia
PCR:	Polymerase chain reaction
PHW:	Percentage hard word
PIs:	Protease Inhibitors
PIL:	Patient Information Leaflet
PLWHAs:	People Living with HIV/AIDS
PMTCT:	Prevention of Mother-to-Child Transmission
RAIN:	Readability Assessment Instrument
RE:	Reading ease
READ:	Read, Educate, Adjust, Develop
REALM:	Rapid Estimate of Adult Literacy in Medicine

RNA:	Ribonucleic acid
SAM:	Suitability Assessment of Materials
SMOG:	Simple Measure Of Gobbledegook
S-TOFHLA:	Shortened Test Of Functional Health Literacy in Adults
TB:	Tuberculosis
TDF:	Tenofovir
TMC 125:	Etavirine
TOFHLA:	Test Of Functional Health Literacy in Adults
UNAIDS:	Joint United Nations Programme on HIV/AIDS
UNESCO:	United Nations Educational, Scientific and Cultural Organisation
USA:	United States of America
USP-DI:	United States Pharmacopoeia Drug Information
USP:	United States Pharmacopoeia
VCT:	Voluntary Counselling and Testing
WMI:	Written Medicine Information
WHO:	World Health Organisation
WRAT:	Wide Range Achievement Test
3TC:	Lamivudine

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CHAPTER 1

INTRODUCTION

1.1 Background to research

Low-literate individuals generally experience difficulty in reading written medicine-related instructions, warnings and labels and may therefore be ill-informed about their medicines [1,2,3,4]. Unfortunately patients often forget or misunderstand the verbal information offered by healthcare providers (HCPs) thereby increasing the risk of poor medicine taking behaviour [5,6,7]. Written medicines information is an important element of patient education and is invaluable for reinforcing verbal communication provided by the healthcare providers (HCPs) [8]. Written medicines information in South Africa, which has traditionally meant the package insert was developed mainly for HCPs and contained in the medicine packaging, is often incomprehensible, contains medical and scientific vocabulary, has small type font and is printed on thin semi-transparent paper [9]. With the high numbers of low-literate individuals in many countries, especially in developing countries, these package inserts may be difficult to read and understand and are therefore largely ignored by patients [9].

The use of patient information leaflets (PIL) as an aid in patient counselling has become standard practice in many countries [10]. PILs have been proven to improve medicines information understanding, enhance recall and assist in promoting appropriate medicine-taking behaviour [6,10]. In order for PILs to be effective, they should be simple, written at a suitable reading level [11] and be developed and tested in collaboration with the target population [12,13].

An estimated 22 million people are living with HIV/AIDS in sub-Saharan Africa and in South Africa, the prevalence rate is at 5.7 million [14,15]. It was reported that at the end of 2007 a total of 45 845 HIV/AIDS patients in South Africa were taking antiretroviral therapy (ART) with 889 000 more people needing to be initiated onto the antiretroviral rollout program [14]. With so many people receiving ARVs, it is important that adequate information at a suitable reading and educational level be produced. Information about HIV/AIDS and its treatment is often complex for patients to

understand and a lack of basic knowledge may lead to less than the desired 95% adherence rate to treatment, with levels lower than this resulting in the development of resistance to the virus. [16]. A simplified PIL incorporating information on the three ARVs constituting the most commonly used regimen in South Africa was designed to address this.

1.2 Study objectives

The overall aim of this project was to develop a simple, easily readable leaflet for communicating basic information about ARVs in order to improve understanding and promote appropriate medicine-taking behaviour. To achieve this aim, the project includes the following objectives:

- To design and develop pictograms illustrating common side effects of ARVs comprising Regimen 1a (stavudine, lamivudine and efavirenz) and illustrating various sources for purchasing non-prescription medicines, and to modify existing pictograms that illustrate storage and medicine-taking instructions.
- To modify a previously developed and tested ART Regimen 1a PIL and incorporate pictograms to tailor it to the needs of a low-literate population.
- To evaluate the format, content, and general design of the ART Regimen 1 a PIL.
- To evaluate comprehension of both the text and pictograms and assess the impact of incorporated side effect pictograms on the understanding of the PIL.
- To investigate the relationship between selected demographic variables and PIL understanding.

1.3 Overview of chapters

Chapter 2 is the literature review and includes an overview of HIV/AIDS history, the global and sub-Saharan Africa HIV/AIDS epidemic statistics, transmission, testing, disease care and management. A review of ARV drug classes, highly active antiretroviral therapy (HAART) used in South Africa and common side effects thereof are also included in this chapter. Adherence to antiretroviral therapy (ART) and various factors that positively and negatively affect adherence are also discussed. Information on literacy, health literacy and its evaluation are also stated along with a synopsis of

patient health-education materials, and the use and evaluation of pharmaceutical pictograms and patient information leaflets in the developing world.

Phase 1, which is a detailed methodology of the design, modification and evaluation of new and existing pictograms, is explained in Chapter 3. This phase is divided into Steps 1 and 2, which focuses on the two distinct methods used to design different kinds of pictograms. There were two stages of pictogram evaluation, with Steps 3 elaborating on the evaluation of newly designed side effect pictograms and modification of previously designed pictograms showing medicine-taking instructions. Steps 4 concentrates on the assessment of other pictograms illustrating different side effects, storage instructions, sources to obtain medicines and miscellaneous information. Qualitative and quantitative results and discussion of Steps 3 and 4 are included in Chapter 3.

The focus of Chapter 4 is the description of Phase 2 of the study in which the methodology of a multi-step, iterative process of PIL design and testing is described. Chapter 5, the result and discussion section, describes the results of qualitative evaluation which resulted in further modification of the PILs prior to the quantitative testing. Quantitative results are presented, followed by results of investigating the association between the understanding of the PIL with selected variables. An overview of the entire design and testing process for both pictograms and PIL is contained in Appendix A1.

In Chapter 6, a general discussion of the findings, within the broader context of the international literature, is presented. This chapter also highlights the study limitations.

The conclusion of the research project is presented in Chapter 7 with the focus being on the practical applications of the results, recommendations and suggestions for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 History of HIV/AIDS

It has been 27 years since the first case of acquired immunodeficiency syndrome (AIDS) was reported in the United States of America (USA) [17]. AIDS was initially thought to only affect gay men and drug users and was consequently called gay related immune disease (GRID) [18]. By 1983, AIDS was reported in non-drug using women and in children. This made it apparent that the disease was infectious [17] and was caused by a human retrovirus, thus the name was changed to human immunodeficiency virus (HIV). In South Africa, the first case was seen in 1982 after which the incidence increased dramatically [17].

2.2 Estimated HIV/AIDS statistics

2.2.1 Global figures

According to the *2008 Report on Global AIDS Epidemic*, a report issued by the Joint United Nations programme on HIV/AIDS (UNAIDS), an estimated 33 million people in 2007 were living with HIV worldwide [14], a decrease from the estimated 37.8 million seen in 2003 [15]. With the implementation of different interventions the number of newly infected people decreased to 2.7 million in 2007 from the 4.8 million seen in 2003 [15,19]. However, there has not been a concomitant significant decrease in the number of people who have died from AIDS-related causes with 2 million having died in 2007 compared with 2.9 million in 2003 [14,15].

2.2.2 Sub-Saharan Africa figures

Of the 33 million people living with HIV globally, a staggering 22 million are from the sub-Saharan African region. The incidence has reduced only slightly from 25 million in 2003, to 22 million in 2007, a possible indication that HIV is not being properly managed in this area [14,15]. In 2007 there were 1.9 million new infection cases and

75% of the global deaths were seen in sub-Saharan Africa [14]. In South Africa, the HIV prevalence seems to have stabilised although it remains very high at 2.7 million [14].

2.3 HIV and AIDS: transmission, testing and clinical staging

2.3.1 Transmission of HIV

HIV transmission occurs through contact with infected bodily fluids e.g. breast milk, saliva, blood and blood products including semen, vaginal fluids, plasma, and wound exudates [20]. This virus is mainly transmitted via unprotected sexual contact with an infected person and by sharing needles and syringes [20,21]. The number of cases of people who have contracted HIV from blood transfusions has decreased significantly, as the blood is now screened for the virus before transfusion, with only suitably low-risk blood donors being selected. Healthcare workers are particularly at risk of transmitting and contracting the virus while using needles or coming into contact with blood. The observance of good practice by healthcare workers may lower the chances of contracting and passing the virus on to patients [20].

2.3.2 Testing for HIV status

Three different types of tests can be used to diagnose HIV status:

1. The ELISA test is an FDA approved enzyme linked immunosorbant assay which screens for HIV antibodies [19,22]. Although highly specific and sensitive, false positive have occurred [20].
2. The antigen test screens for the viral antigen on HIV that provokes an antibody response (P24) but is less sensitive [20,22].
3. The PCR test is the polymerase chain reaction test, which detects HIV genetic material. It is most effective to use from three weeks of suspected infection [22] and is sensitive and accurate over a wide range of viral concentrations [20].

2.3.3 Testing for HIV status in South Africa

Testing for HIV status is generally voluntary and involves three steps. The first step involves pre-test counselling which includes communicating about the virus, ways of contracting and transmitting the virus, as well as the importance of disclosing one's status to at least one person, preferably a family member [22]. An informed consent form has to be signed by the individual prior to testing. The second step is the withdrawal of blood with the purpose of testing for HIV antibodies [22]. Once the HIV status result is known, the individual is counselled again in the third step about the possibility of taking anti-retroviral (ARV) drugs and observing safe sex practices [22].

Due to the HIV antibodies not being detectable in the early weeks after infection, retesting should occur after a window period of three months has passed [20]. Once HIV-positive status is confirmed, viral load and CD4 count tests are routinely conducted. The viral load test estimates the level of virus in the blood [22] while the CD4 count test measures the CD4 or T-helper cells of the infected person.

2.3.4 World Health Organization clinical staging system for HIV/AIDS

The World Health Organization (WHO) clinical staging system for HIV/AIDS, which was developed in 1990, uses clinical parameters to guide clinical decision-making in the management of HIV/AIDS patients in the absence of CD4 cell count results particularly in resource-limited areas [23]. In 2005, the clinical staging system was revised to separate the clinical stages of children, 14 years and below, from that of adults aged 15 years and above [23]. Table 2.1 presents the clinical stages of HIV/AIDS for adults and adolescents.

Table 2.1: Revised WHO clinical staging of HIV/AIDS for adults and adolescents [23]

Stages	Symptoms
Primary HIV infection	Asymptomatic Acute retroviral syndrome
Clinical stage 1	Asymptomatic Persistent generalized lymphadenopathy
Clinical stage 2	Moderate unexplained weight loss (<10% of presumed or measured body weight) Recurrent respiratory tract infections (sinusitis, bronchitis, otitis media, pharyngitis) Herpes zoster Recurrent oral ulcerations Papular pruritic eruptions and seborrhoeic dermatitis Fungal nail infections of fingers
Clinical stage 3	Severe weight loss (>10% of presumed or measured body weight) Unexplained chronic diarrhoea for longer than one month Unexplained persistent fever (intermittent or constant for longer than one month) Oral candidiasis Pulmonary tuberculosis diagnosed in last two years Severe presumed bacterial infections (e.g. pneumonia, meningitis) Acute necrotizing ulcerative stomatitis, gingivitis or periodontitis
Clinical stage 4	HIV wasting syndrome Pneumocystis pneumonia Recurrent severe or radiological bacterial pneumonia Chronic herpes simplex infection (orolabial, genital or anorectal of more than one month's duration) Oesophageal candidiasis Extrapulmonary TB Kaposi's sarcoma Central nervous system toxoplasmosis HIV encephalopathy Extrapulmonary cryptococcosis including meningitis Candida of trachea, bronchi or lungs Isosporiasis Visceral herpes simplex infection Cytomegalovirus infection (retinitis, organ other than liver, spleen or lymph nodes) Invasive cervical carcinoma Visceral leishmaniasis

2.4 HIV/AIDS care and management

As AIDS is a chronic illness, strategies have been implemented in order to provide care to the infected and affected people living with HIV and AIDS. In South Africa training of home based caregivers and community health workers has been introduced. There are more community support groups such as the Hospice and local telephonic help lines to furnish information to both the public and healthcare providers (HCPs). In 2004, the

South African Government released the first *National Antiretroviral Treatment Guidelines* in response to HIV [24]. Interventions include informing, educating and communicating with the public about HIV.

Prevention programmes, which include free access to barrier methods, such as condoms, have already been implemented. Other strategies include an increase in voluntary counselling and testing as well as prevention of mother to child HIV transmission, which are now current practice. Nutritional intervention and emphasis on individual treatment choices would also be executed [24]. Antiretrovirals have been proven to help the body slow the progression of the virus and have become an essential component of managing this disease.

2.5 Antiretroviral therapy in South Africa

There is currently no cure for HIV and AIDS. HIV is a retrovirus composed of RNA that needs host DNA to replicate. The treatment available only slows down the progression of the virus and boosts the immune system. Zidovudine (AZT) was the first drug used to treat the disease in 1987, and although it was found to be ineffective, it was useful in preventing mother-to-child transmission [17]. In 1996 a combination of antiretroviral therapy (ART) proved to be more effective in lowering the progression of HIV [17] and since then different cocktails of antiretrovirals have been used to lower the progression of the virus. The two goals of ART are to reduce HIV-related morbidity and mortality and to reduce the HIV incidence. There are six classification groups of antiretroviral drugs and these are shown in Table 2.2.

Table 2.2: Antiretroviral drug classes and names [20,25]

Drug class	Mode of action	Drug name
Nucleoside Reverse Transcriptase Inhibitors (NRTIs)	Inhibit the HIV reverse transcriptase enzyme and terminate the viral DNA synthesis	Abacavir (ABC) ^a Didanosine (ddI) ^a Emtricitabine (FTC) Lamivudine (3TC) ^{a,b} Stavudine (d4T) ^{a,b} Tenofovir (TDF) ^a Zalcitabine (ddC) Zidovudine (AZT) ^a
Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)	Bind directly to the reverse transcriptase enzyme and block the RNA and DNA polymerase activities. More prone to resistance than other classes	Delavirdine (DLV) Efavirenz (EFV) ^{a,b} Etravirine (TMC 125) Nevirapine (NVP) ^{a,b}
Protease Inhibitors (PIs)	Prevent the viral gag-pol polyprotein from cleaving, which results in non-infectious, immature viral particles	Amprenavir Atazanavir Darunavir Fosamprenavir Indinavir ^a Lopinavir/Ritonavir ^a Nelfinavir Ritonavir ^a Saquinavir Tipranavir
Fusion Inhibitors	Bind to the HIV envelope protein gp41 involved in viral entry	Enfuvirtide
Chemokine co-receptor antagonists	Bind to co-receptors (either CCR5 or CXCR4) on the surface of CD4 cells. They block a required step in viral entry and are the only class of agents that bind to human proteins	Maraviroc
Integrase Inhibitors	Interfere with the merging of reverse-transcribed HIV DNA into the chromosomes of host cells	Raltegravir

^aARVs found in the public sector in South Africa

^bARVs used in the patient information leaflets (PILs) in this study

2.6 Initiation of antiretroviral therapy

2.6.1 Global guidelines for initiating antiretroviral therapy

Table 2.3 shows the recommended guidelines by the WHO for initiating ART irrespective of whether a CD4 count is available [26].

Table 2.3: WHO recommendations for initiating ART in adults and adolescents in accordance with clinical stages and the availability of immunological markers [26]

WHO clinical staging	CD4 testing not available	CD4 testing available
1	Do not treat	Treat If CD4 count is below 200 cells/mm ^{3a}
2	Do not treat ^b	
3	Treat	Consider treatment if CD4 count is below 350 cells/mm ^{3a,c,d} and initiate ART before CD4 count drops below 200 cells/mm ^{3e}
4	Treat	Treat irrespective of CD4 cell count

^aCD4 cell count advisable to assist with determining need for immediate therapy for situations such as pulmonary TB and severe bacterial infections

^bA total lymphocyte count of 1200/mm³ or less can be substituted for the CD4 count and mild HIV disease exists. It is not useful in asymptomatic patients

^cThe initiation of ART is recommended in all HIV-infected pregnant women with WHO clinical stage 3 disease and CD4 counts below 350 cells/mm³

^dThe initiation of ART is recommended for all HIV-infected patients with CD4 counts below 350 cells/mm³ and pulmonary TB

^eThe precise CD4 cell level above 200/mm³ at which ARV treatment should be started has not been established

2.6.2 South African guidelines for initiating antiretroviral therapy

In April 2004, the first rollout of free ARVs to patients was initiated in five hospitals in Johannesburg and since then ARV rollout has spread throughout the country. The South African guidelines for initiating ART in adults include: (i) a CD4 count of less than 250, and (ii) WHO stage four disease (except pulmonary tuberculosis {TB}) [26]. The individual is assessed for willingness, readiness and reliability towards taking ARVs, as well as for any other psychosocial variables such as depression, alcohol consumption and substance abuse. The individual should ideally have disclosed his/her HIV status to at least a family member or friend.

There are three stages for initiation of ART

Stage 1: First screening visit

This visit occurs 2-4 weeks before the individual starts ART and these procedures are followed:

- Confirm the selection criteria: clinic and laboratory personnel make sure to exclude TB or pregnancy
- Treat any opportunistic infection
- Patient's information records need to be completed
- Patient must meet with multi-disciplinary team for group and individual information sessions
- Treatment counsellor/patient advocate discusses treatment with the patient
- 28 day supply of co-trimoxazole is given to patient
- Patient is given a date of return.

The treatment counsellor then visits the patient at home to assess:

- Home circumstances
- Correctness of contact details
- Support structures, including that for disclosure of disease status
- Drug storage facilities

A multi-disciplinary team meets and assesses patient readiness as follows:

- Acceptance of status and ART
- Compliance with the medical criteria
- Absence of severe medical contra-indication, (such as an active disease that is not stabilised, including depression)
- Understanding of the importance of adherence and attendance to all scheduled pre-treatment visits.

Stage 2: Second visit

Multi-disciplinary team discussion covers the following:

- Clinical assessment
- Information and education session
- Pill count (co-trimoxazole)
- Adherence counselling for the patient and treatment counsellor.

Patients who do not meet the treatment readiness criteria should be referred back to their local clinic with a detailed letter. This should include reason for deferment of ART, and possible solutions to enable treatment uptake at a later stage.

Stage 3: ART commencement visit

ART is not an emergency treatment and the pharmacist should be involved as part of the multi-disciplinary team:

- To reassess patient's readiness
- To perform a co-trimoxazole pill count
- To provide detailed description of the drugs
- To discuss further information and adherence issues with the patient and his/her counsellor or advocate
- To re-enforce drug-dosing details before the patient leaves the clinic
- To ensure that instructions are clearly written on the container with a permanent marker.

2.6.3 Antiretroviral regimen used in South Africa

The ARV regimen is selected in South Africa according to factors which include, but are not limited to the following: [26]

- Toxicity profile
- Potential for the maintenance of future treatment options (sequencing of ARVs)
- Promotion of adherence (ARVs with once-daily or twice-daily dosing are preferred)
- Prevalent coexistent conditions (TB and hepatitis B)
- Special considerations for women of childbearing potential or who are pregnant
- Price and cost-effectiveness
- Specific ARV requirements for HIV-2 infections that are naturally resistant to NNRTIs.

Regimen 1 consists of two NRTIs and one NNRTI and is sub-divided into Regimen 1a and 1b (Table 2.4). Regimen 1a is for ARV-naïve patients who are being initiated on ART and Regimen 1b is used for women who are pregnant or are planning to get

pregnant[26,27,28]. Regimen 2 has two NRTIs and two PIs and is used in patients who are not responding to Regimen 1[26,27,28].

Table 2.4: Composition of ARV regimens used in South Africa

ARV Regimens	Dose
Regimen 1a (2 NRTIs and 1 NNRTI)	
Stavudine (> 60 kg)	40 mg 12 hourly
Stavudine (<60 kg)	30 mg 12 hourly
Efavirenz	150 mg hourly
Lamivudine (> 40 kg)	600 mg at night
Lamivudine (<40 kg)	400 mg at night
Regimen 1b (2 NRTIs and 1 NNRTI)	
Stavudine (> 60 kg)	40 mg 12 hourly
Stavudine (< 60 kg)	30 mg 12 hourly
Lamivudine	150 mg hourly
Nevirapine	200mg daily for two weeks then 200 mg 12 hourly
Regimen 2 (2 NRTIs and 2 PIs)	
Zidovudine	300 mg 12 hourly
Didanosine (> 60 kg)	400 mg daily
Didanosine (< 60 kg)	250mg daily
Lopinavir/ritonavir	400/100 mg 12 hourly

2.7 Side effects of drug therapy

2.7.1 Introduction

The WHO defined an adverse drug reaction (ADR) as a drug response that is noxious and unintended and which occurs in doses normally used for treatment, prophylaxis or the diagnosis of disease or modification of physiological function [29]. The Medicines Control Council (MCC), which is responsible for ensuring the safety, efficacy and quality of all medicines used in South Africa, has modified the WHO definition and defined an ADR as a response to a medicine in humans or animals which is noxious and unintended, including a lack of efficacy and which occurs at any dosage and can also result from overdose, misuse or abuse of a medicine [27,30]. This definition includes both registered and unregistered medication.

Researchers and practitioners have conflicting opinions when differentiating between side effects and ADRs. Some state that the term side effects tends to minimize the injury from drugs and may imply that the injuries are minor and predictable [29,31]. Others define side effects as any effect caused by a drug other than the intended therapeutic

effect, whether beneficial, neutral or harmful [29]. These terms can be used synonymously to describe the unpleasant effect that drugs can have on the body when ingested and is the approach that has been adopted in this thesis [29].

Side effects depend on both the drug concentration at the site of action and on the duration and frequency of the drug at this site [29]. They can be dose-related, side effects experienced at maximum dose are referred to as toxic reactions, those within the therapeutic range as collateral reactions, and below the therapeutic range as hypersusceptibility reactions [29].

Side effects can occur at any time during the treatment and may be independent of duration of course. They are classified into six sub-groups [29]:

1. Rapid reactions, which occur when the drug has been administered too quickly.
2. First dose reactions, which occur after administration of the first dose and may not re-occur with subsequent doses. Anaphylaxis can be included in this group.
3. Early reactions, which occur early in the treatment and are generally self-limiting in nature.
4. Intermediate reactions, which occur after a period of time and may not occur.
5. Late reactions, the likelihood of which increases with longer exposure to and continued use of the medication.
6. Delayed reactions, which may occur after withdrawal of the medication.

There are many factors which contribute to side effects such as polypharmacy, ingestion of medication, drug-drug interactions with both over-the-counter (OTC) and prescription medicine, food and herbal remedies [32]. It is important to verify that these side effects are due to the suspected offensive medication and not due to diseases, ailments or genetic predisposition [32,33]. Pharmacovigilance tools exist to assess the relationship of side effects to the offensive medication and focus on time-relationship between drug use and side effect occurrence, pathophysiology, competing causes and response to removal and re-introduction of the offensive drug [31]. Nebeker *et al.* [31] suggests that these tools have four levels of certainty, as discussed in Table 2.5.

Table 2.5: The four grades of certainty that a drug is linked to an adverse effect [31]

Level	Criteria
Certain	A clinical event, including an abnormal laboratory test result that occurs in a convincing time relationship to drug administration and cannot be explained by the concurrent disease or other drugs and chemicals. Removal of drug results in disappearance of side effect.
Probable/likely	A clinical event, including an abnormal laboratory test result that occurs in a convincing time relationship to drug administration but is unlikely to be attributed to current disease, other drugs and chemicals. A response to removal of drug should be significant.
Possible	A clinical event, including an abnormal laboratory test result that occurs in a convincing time relationship to drug administration but could be due to the concurrent disease, other drugs and chemicals.
Unlikely	A clinical event, including an abnormal laboratory test result that occurs in a convincing time relationship to drug administration but is questionably due to the treatment. The disease, other medication and chemicals may prove to be a cause of that particular adverse event.

2.7.2 Antiretroviral side effects

ARV side effects can be drug-specific, class-specific or due to the combination of drugs that constitute highly active antiretroviral therapy (HAART). Side effects can be further sub-divided into short term, long term, life-threatening or self-limiting.

Short-term side effects, which occur shortly after starting ARVs, are generally predictable, mild to moderate in potency and are self-limiting. These may either occur after the first dose or after a few doses, and because of their mild to moderate potency there is no need to stop the treatment. This category includes gastrointestinal effects such as nausea, vomiting and diarrhoea, as well as dermatological reactions, such as skin rash and oral lesions [34].

Long-term side effects may occur after a few months of ARV treatment. These can be life-threatening, such as lactic acidosis, for which treatment should be discontinued or changed. Others are not life-threatening but may result in physical changes, such as lipodystrophy and lipoatrophy, which may cause patients to feel stigmatised. Peripheral neuropathy may occur after a few months of initiating ARV treatment. Table 2.6 shows the different class-related side effects and their onset of action.

Table 2.6: Class-related side effects of ARVs [34]

Side effect	Class of drug	Examples	Onset of action
Gastrointestinal	PIs NRTIs	nausea, vomiting, diarrhoea	early treatment
Rash	NNRTIs PIs	skin rash, maculopapular erythematous cutaneous eruptions, muscle pains and oral lesions, Steven Johnson syndrome	first few days to 6 weeks
Bleeding disorders	PIs		few days to months
Bone disorders	PIs NRTIs	osteopaenia, osteoporosis, osteonecrosis	insidious onset
Hepatotoxicity	PIs NRTIs NNRTIs		few weeks to months
Hyperglycaemia	PIs		weeks to months
Hyperinsulinemia	PIs		weeks to months
Dyslipidemia	PIs	hypertriglycerides, hypercholesterolemia, increase in high density lipids	weeks to months
Lactic acidosis	NRTIs	increase in lactate level, abdominal pain, nausea and vomiting	months
Lipodystrophy	PIs NRTIS	lipoatrophy, lipohypertrophy, dorsocervical fat (buffalo hump)	10 – 18 months

Within each class, side effects may differ between individual drugs. Table 2.7 presents the side effects associated with Regimen 1 used in South Africa.

Table 2.7: Side effects associated with Regimen 1 ARVs [34,35]

Drug	Side effect	Onset of action
Efavirenz	hallucinations, abnormal dreams, dizziness, insomnia, skin rash	first few doses or after 2 to 4 weeks
Stavudine	lipodystrophy, peripheral neuropathy, stomatitis	3-24 months
Lamivudine	nausea, headache, fatigue	2 weeks
Nevirapine	Skin rash, hepatitis, nausea, headache	within first 12 weeks

2.7.3 Management, recording and reporting of side effects

The pattern and frequency of side effect occurrences of the suspected drug should fit the known allergy or pharmacological pattern in order for it to be treated [32]. Even with the known patterns of occurrence, healthcare providers may fail to identify and treat these side effects, thus resulting in inappropriate treatment [31].

Depending on their severity and seriousness, side effects should be resolved quickly. When they cannot be resolved by treatment with another drug or if additional side effects occur when additional drugs are introduced, the offending drug should be withdrawn [30,32]. When polypharmacy exists, the withdrawal of any medication should be preceded by an investigation of the risk/benefit ratio with the reduction of dosage preceding the withdrawal of any medication. Non-essential medication should be removed first [32]. If survival depends on the offending medication, it is best to alleviate the side effects rather than withdraw the medication.

Recording of side effects in the patient file is essential to prevent recurrence of the same side effects and to alert healthcare providers to other possible side effects [30]. A detailed recording of the event should include the name of the drug, dosage, mode of administration, side effects experiences and their severity [30]. Side effect management and the drug treatment used for this should also be recorded [30].

Side effects, once reported, are entered into a national adverse drug reaction database. Each report is evaluated for the causal relationship of the event and the medication [27]. All healthcare providers are responsible for reporting side effects to authorities and to their colleagues. A detailed report of the happenings, diagnosis of side effects and treatment should be provided. Patients should notify their HCPs about any unusual bodily experiences or occurrences [30].

In South Africa, side effects are reported to the MCC and the National Adverse Drug Event Monitoring Centre (NADEMC). NADEMC is responsible for monitoring the safety of all registered medicines in South Africa [27]. The healthcare provider directly involved with patient care [27] should fill in an adverse reaction report form, available from this organisation. Both the non-serious, unexpected and serious side effects should

be reported within 15 days of the first occurrence of the side effect [30]. Non-serious predictable side effects should not be recorded. An additional surveillance unit at the Medical University of Southern Africa (MEDUNSA) has been established to monitor the safety of both ARVs and unregistered medicines used in clinical trials [27].

2.8 Patient adherence to antiretrovirals

The WHO states that adherence is not limited to consuming medication but also includes numerous health-related behaviours [16]. Adherence is defined as ‘the extent to which a person’s medicine-taking behaviour, following a diet, and/or executing lifestyle changes, correspond with agreed recommendations from a healthcare provider’ [16].

2.8.1 Importance of adherence

Poor adherence to pharmacotherapy in chronic diseases is estimated to be 50% in developed countries and is presumed to be worse in developing countries [16]. Poor adherence results in poor management of the chronic illness as well as an increase in co-morbidities and mortality. According to the WHO report *Adherence to long-term therapies: evidence for action*, adherence is the primary reason for sub-optimal clinical benefit and reduced quality of life, and is a significant source of wasted healthcare resources [16].

An adherence level of more than 95% is essential to keep the HIV viral load stable at low levels, to maintain low viral replication, and to prevent opportunistic infections and hospital admissions [16,28,36,37]. As much as this adherence level is ideal, only one third of patients taking ARVs worldwide are adherent to their therapy [16]. An African study reported that one in four patients taking ARVs failed to achieve optimal adherence [36]. Unlike other chronic conditions, the consequences of poor adherence are dire. Viral resistance and cross resistance with other ARVs may occur resulting in more patients being vulnerable and a resistant strain of HIV being transmitted [16,28].

2.8.2 Factors affecting adherence to antiretrovirals

Factors which negatively impact on adherence to ARVs can be categorised into four groups [16,36-39]: disease-related, patient-related, provider-related and treatment-related.

Disease-related factors

Adherence to medication is poor when the illness is asymptomatic and chronic. Advanced illness as well as exposure to painful symptoms and side effects may result in a greater likelihood of the patient following the treatment instructions. In an American study, disease severity was identified as playing a key role in adherence, as patients who have experienced complications from the disease may believe that they are at greater risk of their disease getting worse if they do not adhere to ARVs [40].

Patient-related factors

Acceptance and disclosure of the disease facilitates support from family and friends, which can impact positively on adherence. Culture, religion, health beliefs, health practice and motivation can have both a negative and a positive impact. Failure to fill prescriptions, missing and forgetting doses, incorrect dosing and self-regulating the regimen to manage side effects are additional negative factors [16,36,41]. In 2003, research conducted in Botswana highlighted patient barriers to ARV adherence to comprise of patients forgetting to take their medicines, having no money to buy medicines, and running out of medication [42]. Other factors identified, which contributed to poor adherence, were stigma, hunger, transport costs and substance abuse, including alcohol consumption [36,41,43].

Provider-related factors

In attempting to address adherence, studies usually focus on patient-related adherence factors rather than provider-related adherence factors [38]. With the rise of the AIDS pandemic, healthcare systems have become overworked and understaffed. This has resulted in a lack of counselling expertise and time to counsel patients properly. Providers tend to overestimate adherence readiness and willingness, resulting in

inaccurate adherence predictions [44]. There is a need for providers to assess and counsel patients about adherence at each clinical encounter [45].

Treatment-related factors

Poor adherence can be due to the complexity of the regimen, dosing times and the amount of the pills the patient has to take [16,40,41]. Generally if a dosing schedule that coincides with daily routine has not been planned and implemented, then difficulty in adherence to treatment is likely to occur.

2.8.3. Methods to assess adherence

A number of methods can be used to measure patient adherence and these include pill counts, self-reports, medication electronic monitoring systems, prescription refill records and biotechnology techniques [46].

Pill counts

Pill counts evaluate how much of the supplied medication has been consumed. This can be performed at the patient's home or at healthcare facilities. Adherence is measured by comparing the amount of medication the patient was supposed to use with the amount that is not in the container. Pill counts assume that the number of pills missing from the container represent the number of pills ingested by the patient [46].

Pill counts do not prove that the patient has ingested the tablets at the correct time and as prescribed. However, the advantages of this method are that it is inexpensive, requires very few tools and does not require any special skills making it simple to conduct [46].

Self-reports

Self-reported adherence can be assessed verbally in interviews or via questionnaires and medication diaries. As much as this method is inexpensive, it has numerous limitations [46]. Self-reports have been shown to overestimate adherence due to patient bias. The patient may not want 'to get into trouble' or may want to please the healthcare professional [37]. Miscommunication and misunderstandings between interviewer and patient may occur resulting in incorrect answers [24]. Self-report relies on recall, which

can be problematic when patients forget information related to medicine-taking behaviour [24].

Medication electronic monitoring systems

Medication electronic monitoring systems (MEMS) are computer microchips incorporated in the medication package which record the date and time when the medication container is opened. This method assumes that every time the container is opened, the patient removes and ingests one dose. One of the advantages of this method is that patients cannot tamper with the device and, when used correctly, it can be an accurate reflection of adherence [47].

Problems associated with this method include the unnecessary opening of the medicine container and removal of doses that are not ingested, which will result in device recordings. For some patients MEMS can be problematic especially if the patient takes out some medication to put into portable containers, resulting in an inaccurate adherence measurement. Other problems may include faulty MEMS being used, replacement of broken devices, and expense [16,48].

Prescription refill records

Patient records indicate when and whether patients are collecting medication refills, and these data are used to measure adherence [48]. However, this method only proves collection of the medication but does not prove that the medication has been correctly ingested, or ingested at the right time.

Biochemical techniques

This method measures the concentrations of drug and metabolites in various body fluids. Biochemical techniques can serve as proof that the medication has been ingested but, similarly to pill counts and prescription refills, it does not show whether the medication has been taken correctly at the appropriate dosing intervals [49]. A disadvantage of this method is that each patient's pharmacokinetic factors vary, resulting in the metabolism of the medication being different [24]. Some patients may adhere to treatment in the period immediately prior to visiting a healthcare facility thus creating an impression of adherence [24,50]. This is an expensive and patient-invasive

method as blood samples have to be drawn by qualified personnel and analysed in a laboratory.

2.8.4 Interventions for improving adherence

Most interventions for improving adherence focus on changing adherence patterns. As research has shown that single interventions targeting patient behaviour tend to be ineffective, a multifaceted approach is preferred in which a number of negative adherence factors can be addressed [16,38]. This multifaceted approach uses a combination of the interventions discussed below [38].

Patient-related interventions

Patients on ARVs should be well informed and educated about the medication before commencement of therapy. Treatment objectives, suppression of viral load, problems of resistance, reduction in morbidity and mortality must be discussed prior to commencement of treatment. The provider should identify and communicate with the patient about health, cultural and religious beliefs, values and the available social support system [38]. Motivation and support of patients by the healthcare professional (HCP), family and friends may encourage the patient to be adherent. Teaching patients about self-monitoring and goal-setting may also contribute to improving adherence [16]. In a study conducted by Gray [51], compliant patients stated that a conscious choice to live motivated their adherence to ARV treatment.

Provider-related interventions

HCPs should engage patients in a mutually open respectful interaction, supporting patients in a non-judgemental, non-critical manner when addressing adherence problems [28,38]. Reasons for poor adherence should be addressed in a non-threatening manner, with suggestions for managing side effects and remembering to take medication being provided [39]. HCPs should receive adequate training about ARV medication and counselling in order to fully and appropriately counsel patients [16]. More importantly, they should explain laboratory results such as CD4 count and viral load as it has been shown that when laboratory and physical results improve, resulting in better health, patients become highly motivated to maintain adherence to pharmacotherapy [51].

Treatment-related interventions

Suitable simple regimens with a once daily or twice daily dosing schedule should be considered. Pharmaceutical manufacturers are now producing combination medications to lower the pill burden and are manufacturing extended half-life medications to facilitate once daily dosing, which may be beneficial in improving adherence [38,45,52]. Medication combinations with an improved side effect profile are preferred, for example, the combination of tenofovir, lamivudine and efavirenz has a lower incidence of lipodystrophy in comparison to stavudine, lamivudine and efavirenz [38].

Numerous strategies such as alarms and the use of pillboxes, may be used by patients when socializing or travelling as reminders to ingest medication [51]. It is essential that personalised cues be implemented, e.g. taking ARVs before brushing teeth, as they may also serve as reminders to take medicines and have been shown to improve adherence by at least 30% [16,38,53].

Knowledge of side effects and management of these at the initial stages of ARV treatment is an important aspect of adherence, therefore comprehensive education and information about side effects should be provided to patients. Provision of information relating to possible drug-drug interactions, drug-food interactions, common side effects and their treatment prepares patients to better deal with side effects [16,38,51].

Social support and adherence team

Disclosure of HIV status has been shown to improve support from family and friends and help patients remain self-motivated [51]. Friends and family can serve as solid support systems for patients therefore it is worthwhile to involve them when counselling the patient on the importance of adherence. HIV/AIDS support groups may also be of help to patients to manage negative life stresses and to motivate adherence [16,38].

2.9 Health literacy

2.9.1 Global literacy statistics

The *Education For All (EFA) global monitoring report* from United Nations Educational, Scientific and Cultural Organization (UNESCO) states that one in five

adults in the world, an estimated 771 million people, are illiterate, with two thirds being women [54-57]. Literacy is vital for personal development in the family and community. It improves access to education, political, economic and health services. Figure 2.1 illustrates the global illiteracy rates in 2000. The three continents with the lowest illiteracy rates (below 10% of the population) are North America, Australia and Asia [56].

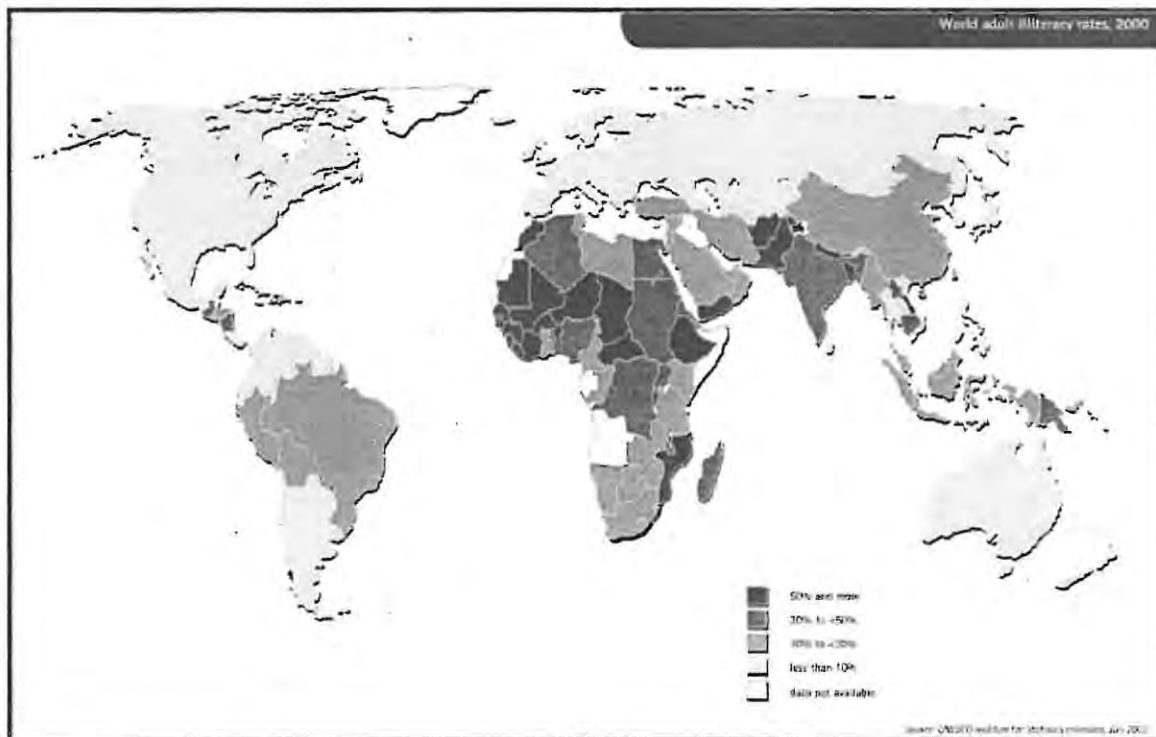


Figure 2.1: World adult illiteracy rates in 2000 [60]

Literacy not only influences social and economic development but also affects health status [58,59]. A spectrum of literacy exists and includes alphabetical literacy, functional literacy, social literacy, information literacy and digital literacy [58]. Information literacy is the most important as it requires critical thinking to locate, evaluate and use information in order to become independent [58]. The Read, Educate, Adjust, Develop (READ) organisation highlighted the importance of improved literacy and suggested that it can contribute to economic growth, reduce poverty, prevent HIV/AIDS and other diseases by keeping people informed, reduce crime and promote democracy [58].

Initially literacy and readability skills were measured according to grade level. An individual was considered literate if he/she could read at 5th grade level or higher. Individuals whose readability was less than 5th grade were considered functionally illiterate [12].

2.9.2 Literacy statistics in Africa

In the 2000 UNESCO survey, the illiteracy rate in Africa was reported to range from 10% to over 50% [60,61]. From the global total of 771 million illiterates, 141 million are from sub-Saharan Africa. However, the western region of North Africa exhibited higher illiteracy rates than the rest of Africa. Mozambique, with an illiteracy rate of 50%, had the highest rate in sub-Saharan Africa, with South Africa's illiteracy rate recorded as below 30% [57,62]. UNESCO estimated that by 2015 the illiteracy rates of most countries will decrease with South Africa's illiteracy rate decreasing to less than 10%.

2.9.3 Literacy statistics in South Africa

In the apartheid era, the majority of Black South Africans had limited functional literacy and this was mainly attributed to the inadequate, unequal schooling system and a lack of action on the part of the government to initiate action to improve literacy. These poor literacy figures were acknowledged by the new democratically elected government, which in 2000 implemented a literacy campaign in an attempt to improve this vital skill [63]. This literacy campaign had three objectives: the first was to significantly decrease the level of functional illiteracy among South Africans, the second was to involve people in social, cultural and economic spheres of society by offering adult education, and the third was to indirectly educate voters for the 2004 elections [63]. The success of this campaign has not been reported.

The literacy rate in South Africa has been reported to be steadily increasing from 2002 and by 2006, 74% of adults in South Africa were considered to be literate [64]. A goal of the government is to reduce the illiteracy rate by 50% by 2015, which is in line with UNESCO's goals to decrease global illiteracy by half by this time [64,65].

2.9.4 Health literacy and its impact on health

Numerous definitions of health literacy exist in the literature. The American Department of Health and Human Services has established a set of health objectives named *Healthy People 2010* (HP 2010) [66,67]. HP 2010 defined health literacy as the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions [12,68,69]. The WHO proposed a broader definition: health literacy was defined as the personal cognitive and social skills which determine the ability of individuals to gain access, understand and use information to promote and maintain good health [70]. These definitions differ from that of literacy in that literacy implies that a person has the capacity to read, write and has basic numeracy skills but does not include the ability to understand, access and use the healthcare system [70,71].

Functional health literacy is the ability to read, understand and act upon health information [72]. Health literacy has become a significant component of both health promotion and improvement. Health promotion aims at improving the accessibility to health systems and maintaining good health, and one means of achieving this is to possess adequate health-related knowledge. Health promotion also aims to empower people with the ability to function within the health system and to develop the skills to access and follow health instructions [72]. Literacy facilitates access to written information, which enhances health. For example, literate parents know when to take their babies for routine vaccines and know how to read instructions to prepare an oral rehydration solution [63].

Hayes *et al.* [73] point out that the impact of poor literacy on health was hidden because there has been little communication in the media about the relationship of literacy and health. A lack of awareness has been noted amongst HCPs of the strong link between low literacy and access to health systems and understanding of health-related information and terminology [74]. Patients with limited literacy are often linked to poor health, they rarely make use of preventative and screening services, have higher hospitalisation rates and tend to misunderstand health-related information [59,74-77]. Findings from Weiss *et al.* [78] also suggest that low literacy impacts on healthcare costs and that these patients require more medical care compared to literate patients.

2.9.5 Low health literacy and written medicines information

Low health literacy is not always restricted to individuals with low literacy [3]. The number of years of schooling does not serve as a good indicator of literacy as literature has shown that reading levels can be three to five years below the completed years of schooling [12]. Individuals with limited reading skills generally experience difficulty in reading written medicine-related instructions, warnings and labels thus may be ill-informed about their health and self-care [1-4]. Although such patients may be able to read the individual words, they may not comprehend the overall meaning of the text and are therefore unable to functionally apply the intended message to maintain or improve their health [12].

Instructions from the text may be taken literally and comprehension can be easily lost due to words being read one at a time without combining them to make overall meaning of the sentence [12]. Low health-literate individuals are often poorly informed about how to improve their health and are less likely to ask HCPs for more information. In many cases, these individuals express a lower degree of satisfaction with their health and perceive it as being poor [76,79].

Identifying low literacy in patients has been difficult as these individuals may keep their low-literacy a secret or even lie about it [1,80]. Studies have shown that low-literate individuals feel embarrassed, stigmatized and generally have low self-esteem [12]. When asked to read, they tend to make excuses, such as forgetting their reading glasses or requesting to read the information at home. If the text is not in their first language, a common response is to claim literacy only in their first language [1,12].

Low literacy has been associated with non-adherence to treatment because either information or instructions were misunderstood or the information was not read at all [4,75,81]. Patients with low literacy skills have poor knowledge about HIV, its treatment and the importance of adherence to treatment [82]. Findings by Kalichman *et al.* [83] show that low-literate HIV/AIDS patients often know less about their disease and its treatment and tend to have a higher viral load than other patients. Wolf *et al.* [82] found that low literate patients often reported missing doses, and when educational

interventions were implemented, adherence increased by up to 40%. In order to improve adherence to medication in low-literate patients, simple information should be furnished, the 'teach-back' technique should be employed and patients should be encouraged to ask questions [3,82].

2.9.6 Measuring health literacy

Various reading tools have been used to screen patients for health literacy, with the most widely used being the Rapid Estimate Of Adult Literacy in Medicine (REALM) and the test of Functional Health Literacy in Adults (TOFHLA) [12,84]. The REALM is a simple test to administer and is based on reading aloud health-related words arranged in three columns in order of increasing difficulty. Correct pronunciation of the words is checked and once the patient cannot read any further or fails to pronounce words correctly, the test is ended [12]. The raw score is the total number of words pronounced correctly and is converted into reading grade range; for example, a person who correctly pronounced only zero to 18 of the total 66 words is classified to be in the third grade and below.

TOFHLA uses the Cloze test. Every fifth to seventh word is omitted from the reading material and the reader is required to fill in the gaps by choosing from a number of appropriate words [12,84]. This test assesses the ability of the individual to understand the passage provided [12]. There is a shortened form called the S-TOFHLA, which is as effective as the original TOFHLA [84]. Both the conventional and short versions of the test may be unsuitable for individuals with reading skills below 6th grade [12].

Other health-related literacy tests include comprehension tests and listening tests. In the former, a specific text to test for reading skills is used and understanding is evaluated, unlike the REALM test which only checks for correct pronunciation [12]. In the listening test, a passage is read aloud to the patient, questions are asked verbally and responses are recorded. Similarly to Cloze tests, this test is used for patients who have reading skills of 6th grade and below who lack reading fluency and are hesitant readers [12].

2.9.7 Limitations of health literacy tests

As much as health literacy tests are useful in assessing the readability of health-related written material, some may be time consuming and require intensive administrator training such as with using the TOFHLA [85]. The major limitation of all health literacy tests is the inability to evaluate illustrations and the design of written material, which may positively impact on understanding [85].

2.10 The use of visual aids in communicating with patients

2.10.1 Introduction

Visuals, symbols and drawings have been used to communicate information since ancient times, for example, cave men told stories and left messages on walls through their drawing. Visuals may be drawn and used for various reasons, such as to warn, encourage, educate and instruct people [86]. Visuals may be more persuasive than written information and may improve written and verbal language because easy stimulation via emotions is rapidly achieved [86,87]. Studies conducted show that pictures are readily stored and are easily recovered from short-term memory; this could be particularly important to people with poor reading skills and limited education [12,13,87-92]. Ideally, visuals are universal and depend on little or no language or cultural background [86,89,93].

2.10.2 Pictorial symbols in everyday use

Pictograms are images that help convey instructions, warnings and precautions to consumers and are extensively used in everyday life, for example, to indicate public places such as public toilets, airports and train stations as seen in Figure 2.2 [88,94,95]. The earliest form of universally used pictorial symbols were traffic information signs [95].

Pictograms may be defined as symbols representing a concept, object, activity, place or event by illustration and may serve as signs or instructions [94]. In general, pictograms are graphically drawn in a fairly realistic style making it easy for the observer to link

them to a real instruction, object or place. Pictograms can include colour pictures, black and white sketches, and photographs. In order for pictograms to be effective they need not be art masterpieces, but can be doodles and simple sketches that do not take that much time to produce [95]. Photographs may be problematic as they may be costly to take and organise. Simple line sketches are more effective than colour pictures [11].



Figure 2.2: Examples of commonly used pictograms

2.10.3 Interpretation of pictograms

The more concrete a message is and the more the graphic relates to its intended message, the more intuitively that message will be understood [95]. Pictograms should be visually simplistic because unnecessary details can cause distraction from the central point, thus resulting in distorted meanings [80,95]. Pictograms can be categorised as either analogous or referent. Analogous images refer to image-related symbols, pictorials or concrete images which occur in everyday life, for example bed, food, bottles, and cigarettes. The more familiar the object is to the consumer, the more easily recognizable it is [80].

Referent images are abstract, arbitrary and concept related symbols [80,95]. People may struggle to recognize these regardless of educational background, although those with low literacy find referent images particularly challenging to interpret [80]. There are different classes of abstractness as shown in Table 2.8, which include prohibition cross, metaphors, suggestions of action, symbols and speech and thoughts. Prohibition cross signs are easier to interpret when used with other images that communicate activities that are perceived to be unhealthy or are discouraged, such as smoking and alcohol.

Metaphorical use of pictograms may rely on the idea that people have been exposed to the metaphor in the media or elsewhere in their daily activities [80].

Table 2.8: Five classes of abstractness in interpreting pictograms [80]

Class of Abstractness	Example
Prohibition cross	Do not smoke, Do not drink alcohol
Metaphors	Heart stands for love
Suggestion of actions	Action lines when moving, kicking, shaking
Symbols	Mathematical symbols such as +,= Correct or check tick ✓
Speech and thoughts	Speech bubble Thought bubble Dream bubble

In one South African study, a higher percentage of the low-literate participants, in comparison to their more literate counterparts, did not recognise action lines with only five of the 30 correctly interpreting the lines in relation to the action [80]. Poorly understood concepts are not restricted to action lines. Speech, thought and dream bubbles are also poorly understood, suggesting that the use of complex abstract concepts, such as movement lines and speech bubbles, should be limited. In the same study, it was proven that mathematical signs and symbols should be used with caution. Most patients fail to correctly interpret '+' and '=' signs when not used with numbers and the '+' symbol is often used to indicate health services, such as clinics, ambulances or hospitals [80].

2.10.4 Cultural considerations with the use of visual aids

The challenge of using pictograms is that they do not always convey the intended meaning and are not universal, due to cultural and language differences making pictograms difficult to understand and recognize [93,95]. What seems obvious to one culture may not be obvious to another, so pictograms should be designed to be culturally suitable for the target audience, particularly a low-literate one [86,89,93,96].

South Africa is a multi-cultural country with 11 official languages, and even within the different language groups, diverse cultures exist. It cannot be assumed that pictograms

designed for one specific culture will be suitable for another. Collaboration with the specific target population in the design and development of pictograms is highly recommended, as it may yield culturally acceptable pictograms specific to that target group [12,93,96,97].

2.10.5 Pharmaceutical pictograms

The WHO [16] stated that medicine-taking behaviour is complex, multi-factorial, and depends on a dynamic interaction of several factors, including cognitive, behavioural, social, environmental and physiological. The basic necessity for patients to take medicines appropriately is to understand the medication instructions and be able to recall them [87]. Low-literate individuals tend to skip unfamiliar words in the text; pictures may prove helpful in filling the gaps [12]. It is suggested that pharmaceutical pictograms should minimize the amount of reading and possess a positive effect on recall and memory [92,98,99]. Correctly understood and interpreted pharmaceutical pictograms can help reduce the risk of poor understanding of healthcare information and can improve comprehension among patients across all literacy levels and cultures [86].

The use of pharmaceutical pictograms has increased over the past 20 years, possibly due to the growing number of patients with special needs, such as senior citizens and low-literate patients [93,99,100]. The importance and usefulness of pharmaceutical pictograms may be evident when used together with text in health-related information leaflets. A proposed combined use of text with pictograms is a useful approach to communicating information for a number of reasons. Pictograms may motivate patients to read medical-related information because they might increase interest in the text, increasing the probability of a careful reading of the text. Repetition and information redundancy of written information may be decreased through the use of pictograms [99].

Low-literate individuals read written information in an erratic order and may not necessarily start at the beginning of the document. When placed appropriately in the text, pictograms may improve organizing the content in medicine information texts, making it easier for patients to follow [99]. Pharmaceutical pictograms make the content

in the reading material more specific to emphasise whether information is about warnings or instructions related to medicines [99].

2.10.6 Pharmaceutical pictograms developed in the United States of America

The United States Pharmacopoeia (USP) defines pictograms as images representing proper ways to take or store medications, precautions, or other important information about a medication that a HCP should provide to his/her patient [101,135]. The first set of signs and symbols was designed in 1987 by the USP Drug Information (USP-DI) division for pharmaceutical labelling standards. These 29 pictograms were tested and modified with the aid of focus group discussions to yield an initial set of pictograms. The focus group discussions consisted of participants of various literacy levels including those whose first language was not English. After a comprehensive and iterative process of modification and testing over ten months, this set of 29 pictograms was published in 1989 [101]. The USP states that these pictograms may be used to reinforce oral and printed information [135].

USP-DI pictograms were developed in a first world, technologically advanced, fairly wealthy and literate country. Many of the images are too sophisticated, technological and ultimately culturally unsuitable for widespread use in patients in developing countries [96]. The symbols, signs and details generally reflect a westernised lifestyle and tend to be unfamiliar to patients in developing countries [89,102].

2.10.7 Pharmaceutical pictograms developed in South Africa

In 2001, Dowse and Ehlers [89] tested a set of 23 USP pictograms in a low-literate, Xhosa population in the Eastern Cape, South Africa and found that they were misunderstood and misinterpreted as they included symbols and signs that were culturally unfamiliar to this population. It was evident that the South African population was from a significantly different cultural and socioeconomic background. In one example, the USP pictogram instruction of 'Do not drink alcohol while taking medicine' had a picture of a filled wine glass, a beer mug and a cocktail glass. The majority of the South African participants interpreted it as take one tablet with three glasses of water. In South Africa, this target population rarely uses these types of glasses to consume

alcohol. However, when shown the South African version of the same instruction which had a picture of a wine bottle, beer carton and beer bottle, all of which were familiar to the local population, the majority successfully understood and interpreted the instruction [102].

These authors [93] modified the USP pictograms to produce pictograms that were more sensitive to South African culture. Twenty-three USP pictograms and their South African counter-parts were tested and compared. The South African pictograms generally yielded an improved understanding of instructions and precautions and were preferred [89,93].

2.10.8 The design of pictograms

In order for a picture to display the intended message, it has to be appropriately designed and be suitable for the target population. When the intended message is not understood, pictograms fail to help individuals understand precautions and instructions [103]. This is particularly important in health-related and medicine-related pictograms because confusion about instructions and warnings can result in misuse of medicines and lack of treatment adherence.

Well-designed pictograms can convey useful information, concepts and instructions at a glance; their ability to communicate medicine information could be a partial solution for low literate patients to understand and recall health-related information [103,104]. Commonly misunderstood pictograms tend to depict abstract information and instructions, for example, 'passing of time', while better understood pictograms tend to look realistic and present solid visible concepts such as 'no smoking' [87,99].

There are two different stages in interpreting pictograms which need to be considered when designing them. Firstly, the individual has to correctly identify the objects in the picture, and secondly, all the objects should be incorporated and integrated to give a clear understanding of the intended meaning of the picture [96]. Problems may arise when the designer's perceptions, opinions and representation of health, disease and medicine are substantially different from those of the intended target audience.

When designing pictograms, research suggests a consideration of four processes. These processes advise that pictograms be aligned with existing knowledge, maintain attention, grasp interest and aid the comprehension and recall of presented information [96,99]. A substantial amount of research in this area has resulted in proposed guidelines for pictogram design, some of which are summarised below [12,86,91,96, 97, 99,104-116]

- Collaborate with the target population and gain insight into their knowledge, beliefs, attitudes and expectations.
- Use familiar objects and symbols.
- Design simple, realistic pictures with limited content.
- Use the whole body image, as isolated organs may cause confusion. However, pictures showing the face and the hands are well interpreted.
- Use multiple-stage pictures with caution.
- Use abstract symbols, symbols depicting motion and conveying perspective with caution.
- Use background space appropriately.
- If used, colours should be as realistic as possible.
- Use the appropriate size and magnifications.
- Pre-test new pictograms in the target population.

The design process is an iterative one which requires the pictograms to be designed, tested, modified and re-tested until they are easily understood and culturally acceptable to the target population [86,97]. However, even after re-testing and iterative modifications, there is no guarantee that all individuals will understand or interpret the images correctly.

2.10.9 Evaluation of pictograms

The success of using pictograms for communication relies on a comprehensive design and testing process [86]. This process is important to assess that the ability of pictograms to communicate the intended message in the target population.

The evaluation of pictograms is based on their success in conveying their intended meaning [12,86]. Various methods to evaluate pictograms have been established, such

as open-ended tests, ranking methods and multiple-choice tests. In open-ended tests the participant is shown a pictogram and is asked to interpret and explain what he/she comprehends in his/her own words [86,89]. In multiple-choice tests, participants are given a pictogram along with limited options from which they have to choose one correct interpretation [86]. Open-ended testing has been proven more successful and is preferred to multiple-choice testing in evaluating pictograms, as it allows participant to offer extra information [117]. Multiple-choice testing may lead to patients guessing the correct interpretation rather than telling you what they really see.

Ranking methods require the participant to sort symbols according to level of difficulty from the easiest to the hardest to understand. The disadvantage observed from this test is that even the highest ranked symbol in a poorly understood set remains a poor symbol [12,86].

Pictograms can be tested within patient information leaflets or, more often, independently. Any pictogram may have numerous interpretations, according to how the observer looks at it and the direction in which the observer holds the picture. When testing pictograms independently, it is important to hand the pictogram to the participant in the upright direction and clarify the context of the information illustrated in the pictogram, in order to minimise potential confusion [13,86,89,93,100,102,118].

The understanding and acceptability of pictorial symbols are guided by international standards which are also used to evaluate pharmaceutical pictograms. For pictograms to be considered acceptable in a comprehension test, the American National Standard's Institute (ANSI Z535.3) advises that at least 85% correct interpretation must be achieved, while the International Standards Organisation (ISO 3864) recommends a criterion of 67% [119,120]. Owing to the importance of understanding medication instructions and warnings, an 85% level of understanding is desired [86].

2.10.10 Practical application of pharmaceutical pictograms

Pharmaceutical pictograms should firstly be tested in healthy participants from the target population and only once they are culturally sensitive and appropriate should they be tested in patients [89]. Misinterpretation of pictograms may negatively affect

medicine-related information and adherence therefore the modification and re-testing of unclear and poorly interpreted pictograms is necessary. Testing pharmaceutical information may have a disadvantage as patients may already know the information being depicted as this may have been presented to them in their counselling thus giving responses according to prior knowledge instead of their understanding of the material provided [206].

The use of pharmaceutical pictograms and a verbal augmentation may help low-literate individuals understand and recall information [12,86,121]. Written information is usually in small font therefore daunting to read, especially for the visually impaired and the elderly, hence pictograms may prove to be helpful in understanding information [12,121]. Pictograms may facilitate understanding to people who are not proficient in medical and health related language and theory [86].

The use of pictograms in comprehension of information has been debated with some research suggesting that pictograms are ineffective and non-beneficial in conveying healthcare and medicine-taking information to patients [97,105,121,122]. Other studies, however, have shown that health-related comprehension and recall of instructions of over-the-counter (OTC) and prescription medicines may be improved by the use of pictograms when supplied with written and verbal information [86,92,93,96,99,100, 122-126].

Although the use of pictograms has in many cases proved beneficial, some concepts and ideas are not readily understood [103]. In an American study, the understanding of selected USP-DI pictograms was assessed in a sample consisting of illiterate and elderly participants and yielded only a 54% correct interpretation [121]. Wolff and Wogalter [105] further illustrated this when they tested 30 USP pictograms and found that the comprehension of several pictograms achieved less than the recommended ANSI 85% criterion.

In several South African studies, the incorporation of pictograms on medicine labels and PILS confirmed that the recall and understanding of medical instructions may be improved. It was reported that patients themselves prefer information with pictograms over text only information leaflets [13,86,118].

The one variable that may indicate the usefulness of pictograms is their ability of these to modify patients' behaviour and influence treatment adherence. This is, however, extremely challenging to measure [96,122].

2.11 Medicine information intended for patients

Medicine information may be provided to patients in various forms including written, verbal or visual formats. Pamphlets, posters, brochures and booklets are the most common forms of written information used to educate patients [59]. As much as written health information is expected to help readers understand and recall information, it often fails to do so, with common problems including unnecessary information and the use of medical terms and jargon that patients cannot comprehend [127]. Language and visuals need to be clear, simple and organized as they are intended to inform and empower individuals [12]. Written information materials should be user-friendly and appropriate for the intended target population but may be more useful and accessible if available in the reader's first language [61].

The development and distribution of medicines information by pharmaceutical manufacturers has increased significantly over the past few decades. Pharmaceutical companies provided medicines information for HCPs to refer to when prescribing or dispensing their products [82,128]. This information was enclosed in package inserts which were mainly technical, scientific and more suitable for HCPs rather than patients. Pharmaceutical companies design and supply package inserts which are distributed with medicines inside the packaging. These package inserts are legal documents and a failure to include comprehensive, evidence-based information can open the pharmaceutical manufacturer to litigation. To protect themselves, manufacturers produce package inserts that are detailed, technical, scientific and precise. However these package inserts are generally unsuitable for patients as they are too technical, contain medical terminology and jargon, appear in small print on thin, transparent paper that is folded in a complicated manner and are therefore of little use to many patients as few bother to read them [9].

Package inserts intended for patient use evolved in the 1970s with the rationale being 'In order to properly use prescription drugs, people need, and have the right to receive information about their drugs.' [82,127]. Even with this focus on their use by the patient, they were still too technical and scientific to be suitable for non-health care professional use and they were found to be misunderstood by patients [127,128].

In the 1980s, patient package inserts became known as PILs as they were designed for patients, with the language and terms used being more patient orientated [10]. Since then PILs have been given different names such as package leaflets, written medicine information and consumer medicine information. In this study, the term patient information leaflet is used.

2.12 Patient information leaflets

2.12.1 Introduction

Patients desire more information about their health and the safe and effective use of their medicines in order to make informed decisions about their treatment [5,6]. Verbal information is inadequate as the only means of communicating information as patients may misunderstand and/or forget the instructions and information [5,7]. Literature shows that patients want information on side effects, medicine-related risks, indications for use, contraindications, and the implications of deciding whether to take medicine or not [6,129].

PILs have increasingly become necessary as part of patient counselling. Kenny *et al.* [10] argue that good clinical practice might be accompanied by PILs in addition to verbal information, to improve recall and understanding of the verbal information provided. The importance of PILs becomes even more apparent when considering adherence as lack of information has been identified as a major factor among 250 reasons why patients do not take their medicines as the prescriber intends [5].

PILs are supplied to improve and increase patient knowledge of medicines with the aim of improving medicine-taking behaviour [6]. PILs, when used correctly and understood, can promote appropriate medicine-taking behaviour and reassure patients about taking

the medication [6]. During patient–HCP consultation, verbal counselling is important and should never be replaced by written information. The combination of oral and written information may be beneficial to the patient, as the written information reinforces verbal communication.

Wording in PILs should be simple and easy to understand and should be written at a reading level that suits the target population [11]. In order for PILs to be noticed and read, the information should be attractive to the reader, readable and match the cognitive level of the reader [11].

2.12.2 PILs in South Africa

In 2003, Regulation 10 of the Medicines and Related Substances Control Act 101 of 1965, as amended, legislated that pharmaceutical companies produce PILs which were to be distributed with all medicines [130]. These PILs were intended for patients, in contrast to package inserts which are legally binding documents included in all registered medicines packaging and which are intended for use by HCPs [130]. The package inserts contain detailed product information, are written at a high readability level and contain medical terminology that is difficult for most patients to understand. The MCC published a preliminary guideline on requirements for readability and content of PILs, as well as compulsory warnings. They have to be available in English and at least one other official language. This regulation offers no restrictions and guidelines about PIL format and design [130].

PILs in South Africa must be approved by the MCC before their distribution with medicines. The MCC published guidelines on PIL design in South Africa to provide guidance on the format, readability, content and information required [131]. The approval of PILs by the MCC will follow a phased–in implementation phase, which allows certain categorised medicines in the essential drug list (EDL) to be evaluated first. The list of priority medicines includes ARVs, antimicrobials, antimalarials, antituberculosis agents, antifungals, chronic medicines (e.g. antihypertensives, hormonal contraceptives, antidepressants, anti-anxiety), sedative and hypnotic agents. OTC medicines with a high potential for abuse are also included in this list [131].

Patients in developing countries, such as South Africa, are usually not supplied with package inserts or PILs, as medicines are bought in bulk and are then pre-packed for patient use [118]. Pre-packed medicines are supplied to patients with a medicine label as the only source of medicines information. Given the under-resourced healthcare systems in all developing countries and the limited time patients get to spend with HCPs, the PIL could serve as an additional valuable source of information to inform patients and influence their medicine-taking behaviour.

2.12.3 PILs and HIV/AIDS

There is minimal written medicines information available and distributed in sub-Saharan Africa [132] although many PILs have been produced in developed countries to communicate HIV/AIDS-related and ARV-related information to patients. These PILs generally address medicine-taking behaviour, adherence and testing for HIV status. In one study it was found that when the public were given the PIL as pre-test counselling for HIV status, a higher proportion of these people tested to know their HIV status [133]. Furthermore PILs about HIV and AIDS have been proven to communicate and guide patients about appropriate ARV-taking behaviour [118,132].

With HIV and AIDS, the adherence level is required to be more than 95%, which is rarely the case [16]. It has been shown that the provision of suitable PILs may aid in achieving higher comprehension of information, which in turn may result in higher adherence rates [13,45]. There is a lot of information that an infected patient may need to know about HIV/AIDS, the treatment, side effects and self-care. The information provided in the counselling may be daunting to the patient or the patient may forget hence a need for PIL to be provided to patients may be beneficial to help them remember information and to help them in understanding the disease better.

2.12.4 Design of PILs

Many factors should be considered when designing all types of written medicines information, including PILs. The reading level, terminology and language of the PIL should equate to that of the intended target population [10,12]. PILs do not need to be complex, technical and scientific, yet also need not be over-simplified because they may

be regarded as lacking authority and may result in readers feeling undermined [12]. Patients appreciate reading PILs about their illness and the treatment thereof but the challenge lies in including an adequate number of relevant facts about the illness and treatment in a style that patients will understand [129].

Numerous studies have proposed guidelines for content to be included in PILs [5,12]. The minimum required information should include the indication of the medicine, how and when to use the medicine, the specific dose and dosing frequency, side effects and contradictions, correct storage and the effects of food on the medicine [131]. Existing guidelines for designing pictograms recommend the following [5,11,12,131,134,135]:

- **Format:** Spelling and grammar in the text should be checked.
- **Language:** Simple, short familiar words should be used as these aid in making the PIL informal and user friendly. Scientific and medical terminology should be limited and where this cannot be avoided, definitions should be provided.
- **Print size and type:** Large type size is encouraged as it facilitates reading. size 10-12 is considered acceptable. Sans serif fonts are often used. Use of bold and italics should be kept to a minimum. The use of capital letters should be avoided because these are difficult to read and slow down the reading process.
- **Layout:** Layout should be consistent throughout the leaflet. The page must not be filled with text and sufficient white space is required to yield a less challenging PIL. Shorter non-justified paragraphs and bullet points are preferred as these organise the text thus making PIL inviting to read.
- **Print colour:** Black print on white background is the most commonly found and best to use since it is easier to read than coloured prints, especially for colour-blind individuals. Red colour should be preferably used for warnings.
- **Syntax:** Short, succinct sentences are preferred to minimise misinterpretation and to make the leaflet informal. These increase the understanding of the written information.
- **Paper size:** A4 and A5 are preferable for long leaflets as these are easy to turn over. Z-folded pages have also been used.
- **Headings:** Headings must be conspicuous and short as these are easier to read. Capitals (upper case words) may also be used for headings.

- **Style:** The active voice is favoured because it personalises the text and minimises confusion and misinterpretation.
- **Graphics:** Pictograms should relate to supplementary text. Decorative images should be avoided as these can cause confusion.

English is not the first language for many patients in South Africa, although it has been used as the language of most PILs. It is vital for the target population's language to be considered when designing PILs. Direct translation from English to another language is inadequate and often results in unnatural phrasing and confusion [12,136]. Linguistics experts from the target population ought to be involved in the translation of PILs from English. Back-translation of PILs into English by a lay individual from the target population is recommended.

2.12.5 Evaluation of PILs

Various methods for PIL evaluation have been explored and these may be direct, indirect, subjective or objective [5]. The indirect methods comprise design assessment tools and readability tests, while direct methods comprise focus group discussions, group interviews and self-administered questionnaires. It is recommended that more than one method of evaluation be used as all methods have different strengths and limitations [12].

2.12.6 Evaluation of design and layout

Design assessment tools are used to assess the design characteristics of PILs that may positively influence understanding, such as the acceptability of PIL layout. Numerous instruments have been developed, tested and validated to assess the acceptability of PILs and include an assessment checklist, the Readability Assessment Instrument (RAIN), Suitability Assessment of Materials (SAM) and the Medication Information Design Assessment Scale (MIDAS) [12,137,138,139].

RAIN is an 8-item tool for readability assessment [137,138]. This tool assesses global and local coherence, audience appropriateness, adjunct questions, writing style,

illustrations and topography. The advantages of this validated tool is that it is easy to use and takes into account a large number of variables that can influence PIL understanding and usefulness [137-139]. The guidelines advise that in order for the material to be regarded as acceptable the following are required :

- a minimum of 80% of paragraphs have to have evidence of structure
- 80% of pronoun references, substitution and connectives have to be rated as 'clear'
- 80% of sentences have to be relevant to the topic for local coherence to be considered acceptable.

MIDAS is a straightforward and reproducible method for the evaluation of design quality [139]. Thirteen items are used to quantify the extent to which the PIL satisfies various design characteristics. The characteristics assessed include, but are not limited to, type size, line spacing, margins, headings, line length, bold and serif style. A point is allocated for the presence of each characteristic with the maximum possible score being 13 [139].

An assessment checklist consisting of 17 items is easy to use and provides a rapid means to assess PILs [12]. The checklist screens good information from the not-so-good and each point is checked off as the material is read. If the material read misses any of the points in the checklist it could indicate unsuitability of the material. The information assessed includes organisation of the content, such as summaries and important points. Writing styles, such as active voice, use of jargon and tone are also evaluated. Evaluation of white space, print size and font are part of appearance assessment. When evaluating the appeal of the PIL, cultural, gender and language appropriateness are checked [12]. This method is good for revising and evaluating materials that are in their draft phases.

The SAM was designed for use with print material and illustrations still in the design phase. It is a 22-item tool that identifies problems which reduce suitability of materials in six steps. Scores are in percentages and the materials may be rated as being in any of the following categories: superior, adequate or not suitable. The SAM process is as follows [5]:

1. Read through the SAM evaluation and criteria list;

2. Read the material to be evaluated and write notes and key points about the content;
3. For short materials evaluate the whole material and for lengthy materials select samples to be evaluated;
4. Using the 22 SAM criteria provided evaluate, rate and score each factor. Most weight should be given to the previously identified key points. For each superior factor 2 points are given, while adequate receives 1 and unsuitable receives zero;
5. Calculate the suitability score by adding up the scores of all 22 factors to get a total. The maximum possible score is 44 (100.0%). Divide the maximum total score by the total of the evaluated material and multiply by 100 to get the percent score;
6. Decide on the impact of the deficiency and appropriate action to take. Revision of materials can be prepared after step five above.

According to the SAM test the percentage rating of 0-39% is classified as unsuitable material, 40-69% is adequate material and from 70-100% is considered superior material.

2.12.7 Evaluation of readability of PILs

There are at least 40 different readability formulas which have been used to assess prose in PILs since the 1920s. These are used to measure the difficulty of printed information and offer grade-level rating [12]. Most readability formulae are fairly accurate in calculating the grade level and may be one grade level out. The concept of these formulae is that the greater the number of multi-syllable words and the longer the sentences, the greater the reading difficulty [12]. Commonly used readability tests include the Fry formula, Flesh-Kincaid formula, the Simple Measure Of Gobbledegook (SMOG) and Gunning Fog formula [12,135,140,142,143].

2.12.7.1 The Fry formula

The Fry formula was developed in 1977 [140]. In this test, three 100-word passages from different content topics in the text are selected. If the sample pamphlet has less

than 300 words, only one 100-word passage may be used. For each 100-word passage, syllables are counted and the average number of sentences of all the 100-word passages is calculated [12,140]. The grade level rating applies from grade 1 to grade 17.

A visual method of this test uses the Fry graph (Figure 2.3) [12,140]. The average number of syllables is plotted by referring to horizontal axis and the average number of sentences is plotted with reference to the vertical axis. The final plotted point is used to determine the readability grade level of the material [12,140]. For a PIL suitable for the participants in this study any grade below grade 9 would be appropriate. The Fry formula is suitable for use with PILs intended for low literate patients as the appropriate grade levels range between grade 1 to tertiary [135,140].

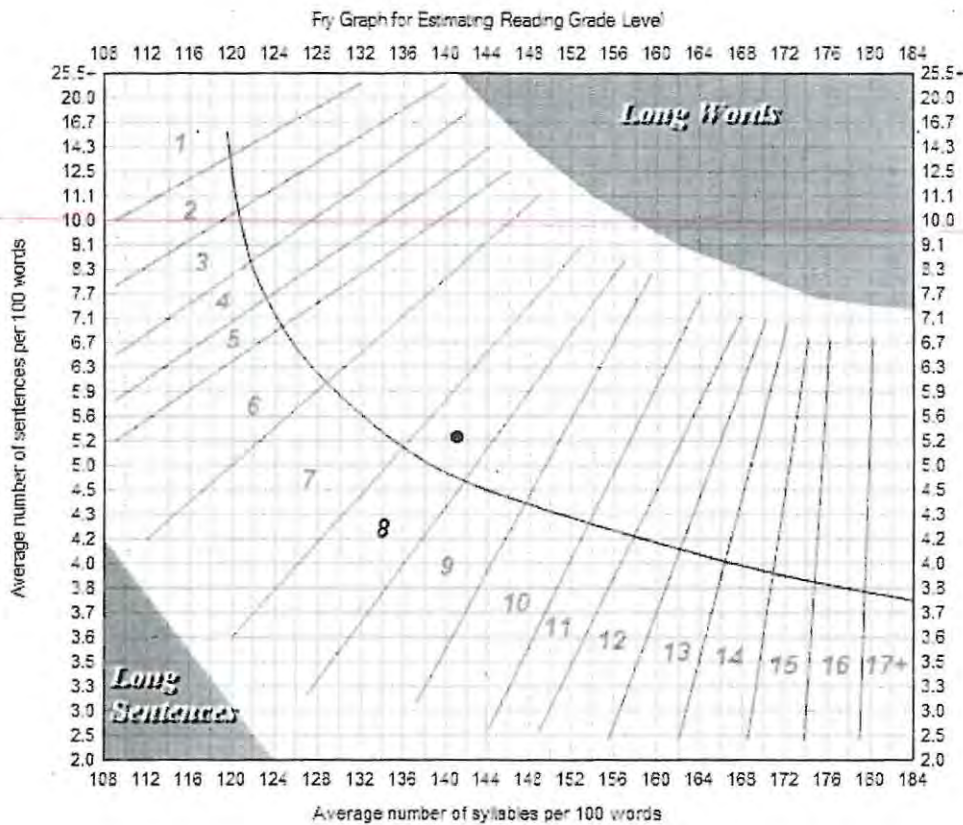


Figure 2.3: Fry's readability graph [141]

2.12.7.2 Flecsh-Kincaid grade level readability test

The Flesch-Kincaid readability test was initially modified and used by the US Navy [140]. Similarly to the Fry test, three 100-word passages are selected. These passages are selected from the beginning the middle and the end of the test sample text. The average words per sentence, or average sentence length (ASL), and the average syllables per word (ASW) are determined and the reading ease (RE) is calculated using Equation 2.1 [135,140]. This method evaluates the readability grade level between grade 5 up to a maximum of grade 12 [140].

$$RE = (0.39 \times ASL) + (11.8 \times ASW) - 15.59 \quad \dots \text{Equation 2.1}$$

If the score is 5.0, for example, it indicates that a fifth grade level reader can read the pamphlet and if the score is 9.3 it indicates that a reader in the ninth grade would be able to read the document [140].

2.12.7.3 The Simple Measure Of Gobbledegook formula

McLaughlin developed this accurate, user-friendly method which estimates the number of years of education needed to read and understand the sample text [142]. Three 10-sentence samples are tested. Words consisting of three or more syllables are counted in the text sample. The result is square rooted then three is added to this new result [142]. An advantage of the SMOG formula is that it is based on 100% comprehension of test materials unlike other test materials which are based on 50% to 75% comprehension [135,142]. A reading level of grade 5 according to the SMOG tool means that all readers at this level will understand the sample text. The same sample text assessed using other methods would be understood by 50% to 75% of the participants reading at a fifth grade level [135].

2.12.7.4 The Gunning's Fog formula

In the 100-word text sample used, the total number of words and sentences are calculated. The ASL in this test sample is calculated. Words with three or more syllables are counted and this does not include hyphenated words, proper nouns and two-syllable verbs ending in 'ed' or 'es' [143]. To get the percentage hard words (PHW), the number

of words with three or more syllables, is divided by the number of words in the text sample. The grade level (GL) is calculated using Equation 2.2 [135,143].

$$GL = (ASL+PHW) \times 0.4 \quad \text{..... Equation 2.2}$$

2.12.7.5 Limitations of readability formulae

Readability tests give an indication of the reading ability needed to understand written information, but are dependant only on word and sentence factors and do not take into account the reader's motivation and subject area knowledge [85,144]. These formulae may underestimate the difficulty of medical information as they do not account for scientific or medical terms which are monosyllabic. Readability tests also do not measure the effects of illustrations and diagrams, and the format of the written material [85,144].

CHAPTER 3

DESIGN AND EVALUATION OF PHARMACEUTICAL PICTOGRAMS

3.1 Introduction

Pharmaceutical pictograms have been defined as simple, clear, graphic symbols that are able to convey their intended meaning to all patients, including those who are illiterate, elderly or visually impaired [145]. Pictograms have been shown to increase understanding and recall of information and medicine instructions [135].

Pictogram design is a complex, multistage, iterative process in which the target population is involved in all stages, including design, modification and evaluation. Inclusion of the target population is essential to ensure that the pictograms are culturally acceptable and communicate the intended message appropriately [82,83,135,145]. During the design process, the images should be preliminarily tested using healthy participants from the target population and only once this process has generated acceptable images, should they be tested and used in patients [83,145].

Most pharmaceutical pictograms illustrate instructions or warnings about taking medicines. A comprehensive literature search revealed no papers that describe the design and evaluation of pictograms depicting side effects caused by drugs, in particular those caused by ARVs. Adherence to ARVs is poor, despite the rigorous adherence requirements for effective outcomes, and one of the reasons for this may be the unpleasantness of side effects experienced [16]. Low literate patients may not adhere to medication because they may not be able to read or understand the written instructions [16]. Using images to educate patients about potential side effects may have a positive effect on their medication-taking behaviour. This process could also contribute to improved identification and reporting of the side effects of ARVs, some of which are potentially life-threatening.

This study addressed the design and modification of pharmaceutical pictograms (Steps 1 and 2) followed by the evaluation of the pictograms in Steps 3 and 4 (Figure 3.1). A comprehensive flow diagram of the whole study can be found in Appendix A1.

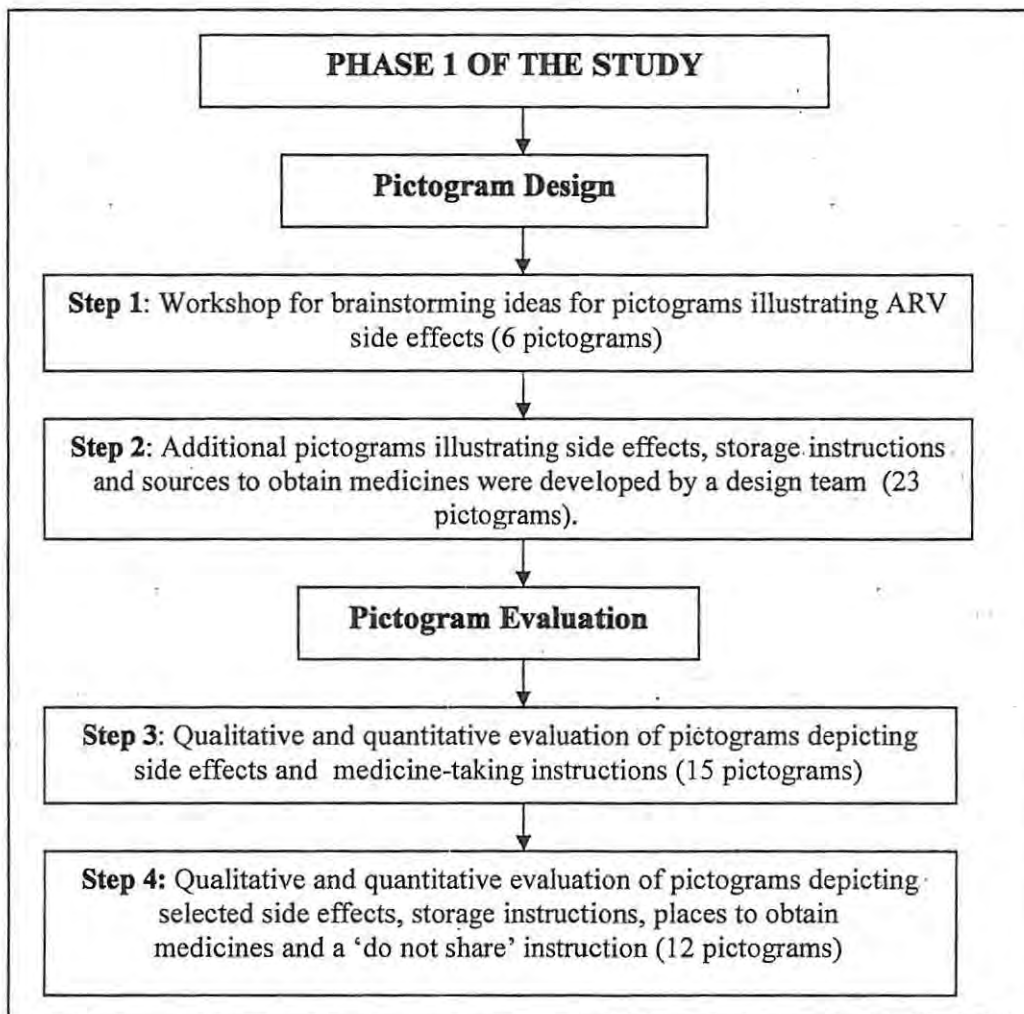


Figure 3.1: Flow diagram illustrating the pictogram study design and evaluation

3.2 Objectives of Phase 1 of the study

The objectives of this phase of the study were:

- To design and develop pictograms illustrating common side effects of the ARVs comprising Regimen 1a.
- To design and develop pictograms illustrating the various sources for purchasing non-prescription medicines.
- To modify existing pictograms that illustrate storage and medicine-taking instructions.

- To evaluate all designed and modified pictograms in a low-literate isiXhosa speaking population.

The study was approved by both the Rhodes University Ethical Standards Committee and the Settlers Hospital Ethics Committee.

3.3 Methodology

3.3.1 Public health sector in South Africa

South Africa's health sector is disproportionately divided into the public sector and the private sector, respectively. The public health sector is government funded and caters for an estimated 85% of the country's population, with the private health sector catering for the remaining 15%. Patients attending the public health sector do not pay for services offered in hospitals and clinics, whereas those attending the private sector pay for these services themselves and are often subsidised by medical aids [146,147]. According to the *World Health Statistics report* pertaining to the period 2000 to 2006, for every 10 000 people attending the public health sector in South Africa there were 8 doctors, 41 nurses and midwives, 3 pharmacy staff and 2 community health workers. This highlights the dire need for an increase in the health work force in this understaffed and overworked sector [148,149].

3.3.2 Study site

The Eastern Cape is one of nine provinces in South Africa, with an estimated population of seven million in 2007 [150,151]. It is the second largest province and has the third largest population in the country [150,152]. The population comprises 88% Blacks, 7% Coloureds, 5% Whites and 0.3% Asians. The most common spoken language is isiXhosa (83.4%), followed by Afrikaans (9.3%) and English (3.6%) [151].

In South Africa in 2006, the adult illiteracy rate in people 15 years and above was 25.6% [153]. Even with the steady annual increase in literacy rate since 2002, this percentage suggests that there is still a high incidence of limited literacy [64]. A large number of people living in the Eastern Cape are low literate as only 6.3% of the



population have a tertiary qualification [203]. The percentage of people 20 years and above with no schooling is 12.4%, which is higher than that of the rest of South Africa (10.4%) [154]. This province is predominantly rural and underdeveloped and it is the second poorest in the country, with 65% of households' annual expenditure of less than R800 [150]. The employment rate is extremely low at approximately 23.0% [155].

The Eastern Cape Province is divided into seven districts with Cacadu District being the largest [150]. It has 58 clinics, 2 community health centres, 10 district hospitals and 44 voluntary counselling and testing sites [150]. The project was conducted in Grahamstown, a small rural town situated in this district. Grahamstown hosts seven of the 58 clinics, one district hospital and one health centre.

3.3.3 Design and modification of pictograms

This process included two major steps:

- Step 1 involved conducting a workshop for brainstorming ideas for visuals illustrating a limited selection of side effects of ARVs. These were then developed, modified and tested using group discussion followed by quantitative testing.
- In Step 2, images for additional side effects were developed by the researcher and her supervisor in consultation with the graphic designer and illustrator. This step included expert input from experienced HIV clinicians. Additional visuals covering other aspects of medicine-taking were developed or modified from previous pictograms following a decision to attempt to illustrate as many points covered in the PIL as possible. As in Step 1, these were modified and tested using group discussions followed by quantitative testing (discussed in 3.3.6).

In Step 1, two workshops were conducted with undergraduate students in their second and third year of study towards a pharmacy degree at Rhodes University. Of the 130 participating students, 10% were from the Xhosa population. Prior to the workshops, background information on pictogram design and development was supplied and problems associated with the design and interpretation of pharmaceutical pictograms was discussed. Basic information on ARVs and their side effects was also supplied. Examples of pictograms extracted from the USP as well as locally designed pictograms

were shown to the students. Intended messages, misinterpretation and misunderstanding of pictograms were discussed and the students were encouraged to offer opinions and suggestions for improvement.

In each of the 45-minute workshops, the participants were divided into 12 working groups consisting of five or six students per group. For every side effect listed below, two groups were selected to provide some rough sketches ranging from the fairly common and familiar experiences (nausea and vomiting) to the more challenging concepts such as peripheral neuropathy which required a particular quality of pain and discomfort to be illustrated. Side effects considered were:

- Nausea and vomiting
- Skin rash
- Abdominal pain
- Nightmares
- Lipodystrophy
- Peripheral neuropathy

Groups were supplied with overhead transparencies and pens for drawing their images. Each group presented its efforts to the class, which were then comprehensively discussed. The rough sketches generated from the workshop were scrutinized and discussed in detail with the graphic designer and illustrator who then modified and refined them. A series of consultations with the graphic designer and illustrator resulted in numerous modifications until draft images suitable for testing in the target population were prepared. The graphic designer and illustrator had previously worked with the group on various projects to design pictograms depicting pharmaceutical messages and concepts.

Step 2 produced 23 pictograms in total. Six of these involved the design of additional pictograms showing other ARV side effects. These were designed by the researcher and her supervisor in collaboration with the graphic designer and illustrator and included the side effects:

- Dizziness
- Fever

- Headache
- Diarrhoea
- Lipoatrophy
- Lactic acidosis

The initial images were generated in one of two ways: photographs were taken of representatives from the target population in various poses to emulate the described side effect, or the image was drawn directly from a textbook illustration or photograph. Again, many consultations with the graphic designer and illustrator resulted in numerous minor modifications to the images before a suitable draft for testing was produced.

Miscellaneous pictograms, 16 in total, illustrating warnings, storage instructions and medicine-taking instructions were also produced in Step 2. Some of these pictograms were modified from previously designed images while others were designed by the researcher, supervisor and graphic designer and illustrator. This set of pictograms included:

- **Storage:**
 - Store medicines in a cool dry place.
 - Store medicines where children cannot reach them.
 - Do not store medicines in the bathroom.
 - Do not store medicines in the car.
 - Do not store medicines in the sun.
 - Do not store medicines by a windowsill.
 - Do not store medicines near the fire.
- **Medicine-taking instructions:**
 - Take medicines with a full glass of water.
 - Take medicines with food.
 - Take medicines once daily.
 - Take medicines twice daily.
- **Places to obtain medicines:**
 - Spaza
 - Sangoma
 - Supermarket

- Pharmacy
- Clinic
- **Do not share your medicines**

All the images were printed on white 12 x 12 cm cards. Printed on one side was a 10 cm x 10 cm image which was large enough to clearly show all details. On the other side a small image (4.5 cm x 4.5 cm) was printed to serve as an example of the size of the images once incorporated into a PIL. These images were to be shown to a group of healthy representatives of the target group in a group interview.

3.3.4 Study population

All participants were healthy, isiXhosa speaking adults who had English as their second language. The study population included both males and females above the age of 18 years from a variety of educational backgrounds ranging from no schooling up to a maximum of 10 years of formal schooling. Different participants were recruited in both the qualitative and quantitative studies. These participants were considered representatives of the average South African patient who is likely to have problems accessing and understanding healthcare information. Participants were excluded if they suffered from any impairment in their vision. Participants were recruited either at one of the primary healthcare clinics in the township called Raglan Road Clinic or from their homes in the township surrounding the clinic. The process of participant recruitment is elaborated on in 3.3.9.

3.3.5 Qualitative evaluation of pictograms: Group interview

This process involved two steps:

- In Step 3, pictograms illustrating side effects (from the undergraduate workshops) and medicine-taking instructions were evaluated.
- Step 4 focused on the evaluation of pictograms illustrating selected side effects (from the design team), storage of medicines, places to obtain medicines, and a do not share instruction.

In Step 3, fifteen images which were correctly identified and those deemed suitable to test according to the design team, were tested in the first hour-long group-interview involving six healthy isiXhosa speaking adults, aged between 30–52 years all with an education level of less than nine years of formal schooling. The researcher conducted this interview in isiXhosa. After welcoming all participants and explaining the application of pharmaceutical pictograms as well as the objective of the interview, a card showing the same large image was shown to each participant who was asked to think about its meaning and how successful it was in communicating this meaning. Participants were then requested to look at the small image on the reverse side of the card and to verbally present their interpretation and their opinion of each image.

Only once all participants had had an opportunity to offer their explanation and understanding of the image was the correct interpretation confirmed by the researcher. Participants were then asked to offer ideas on how to improve each image, to comment on the size and clarity of details on the small images and to evaluate the cultural appropriateness of each image. Toward the end of the interview, the participants were asked to study the images again and offer any additional comments.

In Step 4, 18 of the 23 pictograms designed in Step 2 were tested in a group interview with five participants (different from the previous group interview) who shared similar demographics as those participants in Step 3. Similarly to the pictograms in Step 3, these were chosen according to participant correct interpretation and by the design team. The participants' ages ranged between 18 - 50 years and none of them had progressed beyond nine years of formal schooling. The same process used in Step 1 was followed.

This process enabled the clarity, understanding and acceptability of each image to be commented on and assessed before quantitative testing. Following this, the images were further modified numerous times, paying special attention to cultural relevance and familiarity of concepts in the images. Any unnecessary visual elements were also removed from the pictures in an attempt to generate as simple an image as possible.

3.3.6 Survey instrument for quantitative evaluation of pictograms

The questionnaires used in this study were adapted from one used in a previous research study [135]. The first one was used to test the pictograms in Step 3 (Appendix E1) and the second was used to evaluate pictograms tested in Step 4 (Appendix E2). All the questionnaires were filled in by the interviewer. Both consisted of three sections, Section 1 elicited information on demographics including gender, race, age, home language, education as well as employment. The ability to tell time from a clock face, a digital watch or both was also ascertained.

Section 2 recorded participant understanding and interpretation of the images. The interpretation of each image was recorded as either 'correct' or 'incorrect' and details of incorrect interpretations were noted. The size of the small image printed on the back of each card was also assessed in this section. In Section 3, participant opinion about the usefulness of these images was investigated. This section helped to assess the acceptability and appropriateness of these pictograms for their potential use in patients.

3.3.7 Quantitative evaluation of pictograms: Individual interviews

In Step 3 a total of 15 images were evaluated quantitatively and these included images of the side effects and medicine-taking instructions. An additional, two locally designed and previously tested pictograms were used as examples at the beginning of the session to explain the concept of pictograms to the participants. These examples were 'take your medicines four times a day' and 'do not take your medicines with food'. All pictograms were printed in black ink onto 12 cm x 12 cm white cards with a large image on one side and a minimised version on the other side. All the cards were numbered.

A total of 12 images were assessed quantitatively in Step 4. Pictograms tested included 'where not to store medicines' images and 'where to obtain medicines' images. Similarly to side effect pictogram testing, these were printed on 12 cm x 12 cm white cards with a large image on one side and a smaller print (4.5 cm x 4.5 cm) on the other side. All the cards were numbered.

3.3.8 The use of community healthcare workers

Community healthcare workers play a vital role in the under-resourced South African public health sector. They are volunteer members of the community who work part-time at understaffed clinics and hospitals. These community healthcare workers are trained to be equipped with the appropriate basic patient-counselling skills on common illnesses and diseases. Community healthcare workers interact with both patients and the local community to deliver health education. In this study, the researcher worked with two isiXhosa speaking community healthcare workers, whose role was to approach potential participants and encourage their participation in the study. Their familiarity to members of the local community facilitated the process.

3.3.9 Interview process

A standard approach was adopted for each individual interview. The researcher and two community healthcare workers, one of whom introduced all three members of the research team in the following manner, approached participants:

"Good morning/ afternoon, my name is Thandiswa. I am a community healthcare worker at Raglan Road Clinic, this is my colleague Lindelwa, and that is Thato. Thato is from the Rhodes University Pharmacy Department. She is doing a project for her studies. We were wondering if you would be interested in participating in a study".

If the potential participant showed some interest and was willing to proceed further, the researcher elaborated on the study by saying:

"Please sit down and relax, I will not take too much of your time. As mentioned before by the community healthcare worker the project focuses on testing images showing medicine-related warnings, instructions and side effects caused by medicines. This is not a test to see how clever you are, it is a test to see if the images we have drawn are easy to see and understand. I will show you some images and I need you to tell me what you understand and see from the pictures. Please remember that all images are related to medicines".

"Before we start I would like to know if you have been to school. If you have, to what standard did you attend and how many years were you at school?".

If the participant had more than 10 formal schooling years, he/she was thanked for volunteering but told that he/she did not qualify for the study.

A Snellen chart was used to assess eyesight. The researcher stood with the chart three meters away and asked the participant to look at the 20/40 line of characters. Only if the participant could read these, did the interview continue. If not, the person was thanked for volunteering but told that good eyesight was necessary for seeing and evaluating the pictures. Previous research findings indicated that there was a tendency of participants to blame poor eyesight when they were unable to interpret the pictograms [1,12,118]. As many older public health sector patients have never had their eyes tested, this variable needed to be controlled.

Once the participant had met all the above-mentioned inclusion criteria, demographic information was collected and, after looking at the provided watch face, he/she was asked to state the time. The two pictograms, used as examples, were then shown along with an explanation that all the images would typically be seen on medicine information leaflets or medicine labels. Participants were asked to explain what they saw and understood from the sample pictograms and this was followed by the researcher explaining in detail what each image showed.

The researcher moved on to the next section only once the participant fully understood the process that was to occur. The researcher then told the participants:

"I am now going to show you more images which are similar to these two (pointing to the previously used examples). They all are related to medicines and may be used in medicine labels or information leaflets".

The pictograms were shown individually to the participants in a random order. After looking at each pictogram, each participant was asked to offer his/her understanding and interpretation of the image. Any additional information, including incorrect interpretations, was also recorded. The criteria for correct interpretation included that the participant correctly identify objects in the pictogram, give an overall explanation of what they see and understand in the pictogram and relate all the information in the pictogram to medicine usage and storage. The correct interpretation of the incorrectly interpreted pictograms was offered to the participant at this point.

Questions on opinion, perceptions and acceptability of the pictograms addressed in Section 3 were then asked. An honorarium of R40 was given to the participants to show gratitude for their time and valuable input.

3.3.10 Data analysis

Interpretation of pictograms was classified as either 'correct' or 'incorrect' and for each participant, a total correct score was calculated. One way ANOVA and t-tests were used to investigate differences in interpretation associated with the variables of gender, age and education. The level of significance was set at 5%.

3.4 Results and discussion

3.4.1 Qualitative evaluation of pictograms

3.4.1.1 Side effect pictograms

There were various versions of the images generated during the modification and development process and these are shown in Table 3.1. The description of the side effect described in the heading will be followed by either workshop or design team:

- **workshop** indicates that the ideas for images were generated during the undergraduate workshops (Step 1).
- **design team** indicates that the ideas for and design of the images were developed by the researcher, supervisor and the graphic designer and illustrator who together constituted the design team (Step 2).

Nausea and vomiting: workshop

Nausea and vomiting are familiar, common side effects experienced by most people. Recognizable, realistic pictorial concepts generally clarify and facilitate understanding, as little is demanded of the individual to visualise and understand the concept [86]. The initial sketch by the students showed a side view sketch of a person vomiting into a bucket and also illustrated the churning and regurgitation of the stomach contents. Cross-sectional anatomical images are generally difficult for low-literate people to

recognise, interpret, understand, and require some basic knowledge of human anatomy, which may be rare in these individuals [12]. When using cross-sectional anatomical images, a synthetic model of that same anatomical part may be used to explain and assist the viewer in visualising the image. Version 1 by the graphic designer and illustrator showed only the head. A design team decision was made to show more of the body in order to illustrate a typical posture when vomiting.

Excessively detailed visuals may overburden the viewer resulting in an overwhelmed, confused viewer [86,156]. Version 2 included lines on the clothing representing creasing which were considered unnecessary and which were removed to simplify the image. A side view was adopted to illustrate the typical forward bending posture when vomiting (Version 3) and, on testing, was well understood by all participants who considered it to be self-explanatory and easily recognisable. The depiction of the vomitus was considered to resemble 'a forked tongue sticking out of the mouth'. This was modified to create a space between the vomit and the mouth, and smaller food particles/liquid droplets were substituted for the previously more solid-looking image, resulting in the Final Version.

Skin rash: workshop

This image was one of the easiest and simplest to produce. The students sketched a person with spots covering the whole body, with the hands scratching the chest in the initial sketch. With ARV usage, the rash may present differently in various parts of the body but typically occurs as an inflamed, itchy, confluent rash most prominent on the body and arms [157,158]. Version 1 illustrates this distribution. As action lines are often difficult for the low-literate viewer to interpret thus often ignored, other clues that support an action are sourced [80]. In designing this image, the scratching motion had to be included as it accentuated a scratching action rather than a static positioning of the hand on the upper arm.

The Final Version was reworked to distinguish between skin rash and body hair by darkening and increasing the spots constituting the rash; this version was easily recognised by the participants.

Abdominal pain: workshop

The initial sketch portrayed an upright person holding the stomach area, and included a speech bubble, tears from the eyes and short dashes around the forehead representing pain. This included many elements to interpret and integrate as it is well established that too many elements in the image may distract the viewer and cause an unskilled viewer to miss the central focus of the image. Viewers with low literacy skills also often experience difficulty in integrating the various elements to produce a cohesive, meaningful story [12,80,159]. The graphic designer and illustrator produced a whole body image of a person bending forward holding the stomach in pain (Version 1) which was then modified to emphasise only the upper body area as shown in Version 2. However, the side view angle and the position of the arms presented a distorted picture indicating that the person was holding his side rather than his stomach.

In the Final Version, the body was shown at a 45° angle with the hands clearly holding the stomach area. The facial expression with the creased brow and open mouth represented pain. This image was well understood and easily recognisable by the participants interviewed.

Nightmares and hallucinations: workshop

Nightmares, insomnia, drowsiness, abnormal dreams, hallucinations and dizziness are central nervous system-related side effects induced by efavirenz that may occur over a range of 1–116 days, with 13 days being the median [25,160]. Night-time administration on retirement is preferable as this helps to manage the side effects [161]. There is no need to discontinue this medication as the side effects resolve with time [25].

The initial sketch of a person sleeping on a bed was modified to one showing only the upper torso (Version 1). This saved space in order to show maximum detail of the elements in the dream bubble. To depict the idea of nightmares, the use of metaphoric objects was necessary. Caution should be expressed when communicating metaphoric visuals as their interpretation is frequently culture-dependant [80]. The students suggested metaphoric objects such as skeletons, animals and tombstones. Skeletons and tombstones were considered inappropriate as their use could suggest that the medication is dangerous or that it is a poison and may result in death, which could deter the patients from adhering to the medication.

Version 1 included a bottle with a 'skull and crossbones' in the dream bubble but this was excluded because this symbol may be associated with poisonous substances. This image was removed from the pictogram. Because ARVs have often been on the receiving end of negative publicity in South Africa due to their apparent 'poisonous' qualities cited by certain politicians, community leaders and traditional medicine healers, a fierce-looking, wolf-like animal was included with fangs-bared.

The dream bubble in Version 2 contained a more menacing looking animal with its paw apparently 'touching' the sleeping person's forehead, an eye, an explosion symbol and a long dagger, also drawn as though touching the face. The design team decided that all the visual elements should be contained within the dream bubble to avoid confusion and literal interpretation of the elements (Version 3). However, comments from miscellaneous observers were that a larger bubble size could result in people focusing on the contents of the bubble rather on the concept that was being communicated i.e. experiencing nightmares or hallucinations.

In the Final Version, the size of the bubble was reduced and the smallest circle of the dream bubble touching the face was also removed as it created confusion because of being thought of as reflecting a bulging eye. In the group interview, the participants recognised the sleeping person experiencing a nightmare.

Lipodystrophy: workshop

Lipodystrophy can be defined as maldistribution of body fat including both loss of peripheral fat from arms, legs and face and lipoaccumulation in the trunk, back of neck and breasts. It is caused by long term use of PIs and NRTIs with the main offending drug being stavudine (d4T) [20,25,162]. This disorder is one of the classic examples of appearance-related side effects, which are reversible when the dose of the offending drug is reduced or the drug is removed [154,162]. Both female and male images of the lipodystrophy pictogram were designed.

The sketches from the workshop illustrated the areas affected by lipodystrophy in separate images. Version 1 showed both male and female images of a normal unaffected body next to one that exhibits lipodystrophy. These were drawn with exaggerated buffalo humps, heads jutting out to the front and larger stomachs.

Table 3.1: Modification of side effect pictograms designed in the workshop













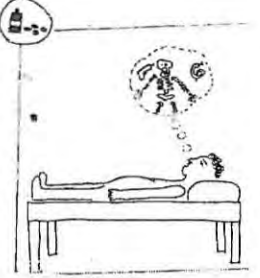





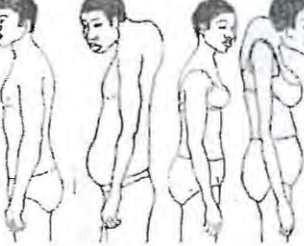
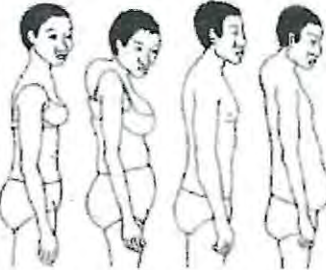

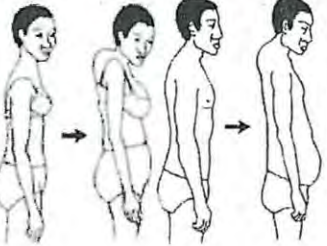
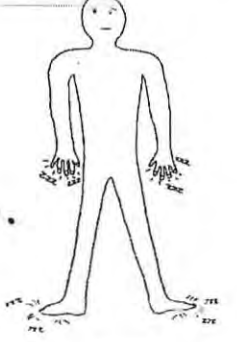
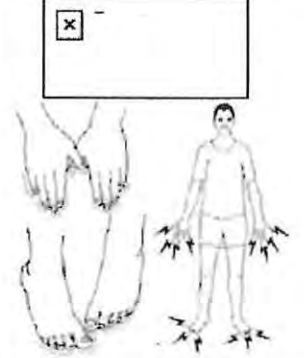
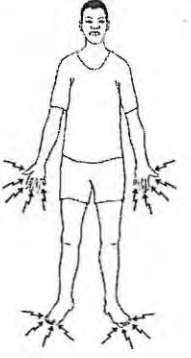
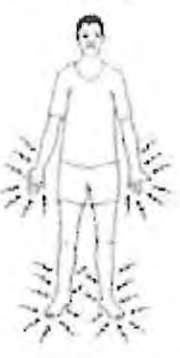

Name	Initial sketch	Version 1	Version 2	Version 3	Final Version tested quantitatively
Nausea and vomiting					
Skin rash			<p>-----</p>	<p>-----</p>	
Abdominal pain				<p>-----</p>	

Table 3.1 (cont.)

Name	Initial sketch	Version 1	Version 2	Version 3	Final Version tested quantitatively
Nightmares					
Lipodystrophy					
Peripheral neuropathy					

^aTested in Step 3 group interview

^bTested in Step 4 group interview

^cBoth tested quantitatively

Attempts were made to show facial changes in fat distribution but the small size of the images would have made these unrecognisable. To focus on and emphasise these facial changes, an establishing shot would have been appropriate by showing an image of the whole upper body and face and then zooming in on a close up of the actual changed portion. These establishing shots orientate the viewer to the zoomed area of an unknown concept [156], in this case the sunken portions of the face. However, this approach was not adopted in the interests of keeping images as simple as possible,

In a multistage modification process of Version 1, the buffalo humps at the back of the necks were reduced, thinner limbs were drawn and the bigger abdominal girth was retained. The resulting Version 2 images were discussed in the group interview and the participants stated that the body changes were clearly visible except in the face. Small arrows were included in the Final Version to illustrate the progressive changes in the same person before and after ARV use.

Peripheral neuropathy: workshop

Peripheral neuropathy is both a symptom of AIDS progression and of ARV use [20,160]. It is frequently observed in patients ingesting NRTIs such as stavudine (d4T), but can also occur with the use of the triple regimen treatment [25,160,163]. The symptoms initially include numbness and periodic shooting of pain in both feet and hands, starting with the feet [160]. Patients have described the symptoms as burning, numbness, 'pins-and-needles', cramping and an aching sensation [160]. This is a classic example of side effects that may occur after long-term use of ARVs but may resolve when d4T is discontinued from therapy or when the dose has been reduced [25,34,160].

The students included small 'z' symbols around the fingers and toes to indicate numbness in the initial sketch. This symbol is non-specific and vague and is not a well-established graphical convention. It could also represent either sleeping or snoring. Prior knowledge, as well as visual exposure to this symbol, is important in order to understand it and this is unlikely in this target population, hence these symbols were removed.

Three images depicting peripheral neuropathy were designed and discussed in the group interview (Version 2). The participants were asked to choose the image that best depicted 'pins-and-needles'. It is well documented that low-literate individuals find it difficult to identify body parts when detached from the whole body [89,112,164]. This was reinforced by the participants who chose the whole body image of the man to be the best one as they considered the two images showing hands and feet as being unclear and confusing.

The sensation of pain was represented in the hands and feet by jagged lines headed by arrows (Version 2). However, on reducing the size of the image, they appeared proportionately too large and were too close to the body making it appear as though they were an extension of these extremities. Participants also commented that they looked like long nails.

To illustrate the typical glove and stocking distribution pattern more accurately [20], the jagged arrows were extended up the arms and legs and were reduced in size (Version 3). Version 3 and the Final Version were later tested in another group interview to ascertain which image best represented this side effect. The participants commented that Version 3 with the jagged arrows looked as though the person has joint pain rather than communicating a 'pins-and-needles' sensation, which led to further modification and the arrows were replaced by pins.

Dizziness: design team

Dizziness can be described as the state of disorientation, a feeling of movement within the head such as giddiness, light-headedness or a whirling sensation [165]. This sense of imbalance is one of the CNS side effects caused by efavirenz (EFV) and, similarly for the alleviation of nightmares, the drug is best taken at night.

This side effect may be experienced by all patients taking EFV, but due to slow plasma clearance in African-American people, they may experience dizziness more rapidly than Caucasians, this was found in an American study conducted [166]. This finding is important, as this could also possibly apply to South African Blacks thereby increasing the need for counselling these patients initiated on ARVs about this side effect.

The initial image as seen in Table 3.2 was of a woman with hands by her temples, eyes open and a twirl around her head. The twirl is an abstract convention that needs to be learnt and could cause confusion to the low-literate viewer [80,86]. However, the design team retained this convention to represent dizziness as no viable alternatives were available and it is a commonly encountered graphic.

In Version 1, this twirl was elongated and moved to avoid overlapping any part of the head or face. The eyes were drawn as being closed as this is a common reaction when experiencing dizziness. In the group interview, one of the participants did not understand what the twirl represented and remarked that the woman looked as though she was thinking. A suggestion was made that tilting the head may help to illustrate dizziness.

The eyes were re-opened and the head was tilted slightly to the side in Version 2. The design team felt this image was still not successful in demonstrating a disorientated, dizzy person. In an attempt to capture body posture and to convey the idea of unsteadiness, a photograph was taken of a woman leaning against a door frame and holding on to the other side of the frame and this was drawn to produce the Final Version. The twirl was retained in this image. In a further group interview, the participants commented that the person leaning against the door gave them the clue that the person was experiencing dizziness and was helping to balance herself by holding on to the door frame.

Fever: design team

The fever occurring in HIV/AIDS patients may be caused either by opportunistic infections such as *Pneumocystis carinii* pneumonia (PCP) or by ARVs [34,167]. This side effect is often associated with a rash [158,168].

The initial sketch was of a sweating person with eyes open and a hand on the forehead. The sweat droplets were drawn dripping down the face and chest while the hand was placed far up the forehead by the hairline. The position of the hand to check for a fever was incorrect, and it is unlikely that sweat droplets would be visible. The hand was repositioned and the sweat droplets were removed from the face but were retained on the chest in an attempt to emphasize the sensation of extreme heat. Three lightning bolts

were added to draw the viewer's focus to the forehead. The design team thought that the lightning bolts may be associated with pain rather than heat radiation and replaced these with shorter, jagged lines to represent heat radiating from the head (Version 2) as seen in Table 3.2.

In Version 3, the idea of heat radiating was represented using a different image, making this concept and representation of heat more prominent and visible. The sweat droplets on the chest were removed to avoid any potential confusion with them being seen as spots constituting a rash. Informal questioning of people indicated that this was not a popular image, so the lines were again modified to wavy, irregular lines surrounding the head and shoulders (Final Version).

Participants did not immediately recognise this image, as it was generally thought to represent a headache. However, when asked how they check for a high temperature, all participants stated that they check the forehead, which then acted as a trigger to understanding the image after which they all agreed that it looked as though the person had a fever. This is a good example of an image that requires an initial explanation to ensure correct interpretation, after which it should be readily recalled.

Headache: design team

The initial image was of a woman looking down, eyes closed, holding her head. Lightning bolts striking her head were added to emphasize the pain sensation (Version 1). As the head appeared to 'float', shoulders were added (Version 2).

Version 2 was discussed in the group interview. Participants commented that the hands on the temples, and the arrows close to the hands, suggested a headache restricted to the temples. They recommended that more lightning bolts be added to show that the whole head is affected, as can be seen in the Final Version.

Table 3.2: Modification of side effect pictograms designed by the design team





















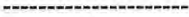



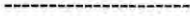
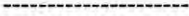
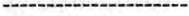

Name	Initial sketch	Version 1	Version 2	Version 3	Final Version tested quantitatively
Dizziness				<p>-----</p>	
Fever					
Headache				<p>-----</p>	

Table 3.2 (cont.)

Name	Initial sketch	Version 1	Version 2	Version 3	Final Version tested quantitatively
Diarrhoea					
Lipoatrophy					
Lactic acidosis					

^aTested in Step 3 group interview

^bTested in Step 4 group interview

Interestingly when Versions 1 of the dizziness image and the headache images and the Final Version of the fever image were shown individually, they caused confusion as participants said they all looked as though they were demonstrating aspects of a headache. At the end of interview, when the participants were shown all three together, they stated that the three looked like a sequence showing the increasing intensity of pain, with the headache image suggesting a headache, the fever image depicting a worsened headache concentrated on the forehead and the dizziness image indicating a dissipating headache.

Diarrhoea: design team

When designing the image depicting diarrhoea (Table 3.2) it was vital to take into consideration the participant's culture and attitude. Caution should be exercised because pictograms lacking cultural specificity may be difficult for the target population to understand and may possibly be offensive [86,169]. The design team was concerned about illustrating this concept without creating an offensive image.

The initial sketch was drawn from a side view photograph of a man sitting on the toilet seat with his pants pushed down onto his thighs, hands balancing the head and the face not visible. Despite the semi-nudity of the person in the image, the design team proceeded to use this as a starting point of this pictogram. In Version 1, the arms were repositioned to hold the stomach and the face was fully visible. When tested in the group interview, the participants initially said this image was obvious to understand but suggested that loose stools be drawn to avoid other people thinking the person is 'missing the pot' or is just sitting there or is maybe constipated. This resulted in the Final Version in which loose stools were added.

Lipoatrophy: design team

This side effect is part of lipodystrophy whereby fat loss occurs from the face and limbs [34,170]. Generally, with the disease progression, the infected individual does lose body mass although more muscle mass is lost rather than body fat. In women, wasting can start with fat loss [171]. Lipoatrophy is predominantly observed in patients taking PIs and NNRTIs. In one American study, lipoatrophy was examined by use of Dual X-ray absorptionmetry and it was found that patients on a PI-based regimen had the highest

incidence of lipoatrophy followed by those on NNRTIs then lastly the NRTI-ingesting patients [172].

This image (Table 3.2) was adapted from the lipodystrophy image and used the same unaffected 'healthy' male and female images. The 'wasted' male and female were newly designed. Wasting was shown in the face using sunken cheeks, rib lines were drawn to illustrate anorexia and the limbs and torso also depicted anorexia. Similarly to the lipodystrophy image, arrows were used between the 'healthy' person and the 'wasted' person to show the progression of fat loss occurring in the same person.

Lactic acidosis: design team

Lactic acidosis is a life-threatening side effect caused by long-term use of NRTIs and HAART mitochondrial toxicity [35]. It is characterised by fatigue, weight loss, abdominal pain, nausea and vomiting and elevated lactic acid levels, any of which could occur acutely or gradually [35,160]. Because the potential risk factors include females, obesity, acute infection, and pregnancy, the design team decided on an image of an obese woman holding her stomach while vomiting into a bucket. [25,35,160]. To differentiate this image from the nausea and vomiting image, an obese woman was drawn unlike the lean person drawn in the nausea and vomiting image. No further modifications were made to this image, which was well identified.

3.4.1.2 Storage pictograms

Patients should be educated about correct storage of medicines as drug efficacy may be lost due to hydrolysis and oxidation. The accelerated aging of tablets may result in changes in bioavailability and chemical changes may result in toxic products [173]. Most ARVs, in either tablet or capsule form, should be kept in a cool dry place, with the exclusion of lopinavir/ritonavir (Kaletra) which should be stored in the fridge [174]. Table 3.3 shows the modification of the various storage pictograms.

Store medicines in a cool dry place

Mwingira [118] modified and tested the initial pictogram used in this study. The concept of keeping medicines in a cool dry place was illustrated with a shaded interior of a medicine cabinet. The sun and fire, representing sources of heat, were included in this

original version but were removed from the Final Version as these issues had been separately addressed in the 'do not store' pictograms. The medicine containers were modified to look the same as those in the cupboard of 'keep medicine out of reach of children' pictogram.

Store medicines away from the reach of children

The original pictogram was developed and tested by Mwingira [118]. This image of the medicine cabinet/cupboard was modified to duplicate the design of the cupboard in 'store in a cool, dry place' (Version 1). The medicine packaging was ultimately modified to replicate the containers in which ARVs, for adult use, are dispensed locally. The Final Version was easily understood by all participants.

Do not store medicines in/near the sun, sunny window, bathroom, car, fire: design team

The graphic designer and illustrator produced initial sketches for all these pictograms and subsequent modifications were applied simultaneously to all pictograms. Dowse and Ehlers [164] found that the prohibition cross was better understood in this population than the traditional single 'do not' slash for negation based on road sign convention. The initial sketch included a thick black cross drawn across the entire pictogram, but on discussion, the design team felt that this dominated and minimised the impact of the individual visual. The cross was then reduced in thickness and size (Version 1). Interestingly, this elicited a subtle difference in interpretation in the group discussion. The thick, large cross clearly communicated, for example, 'do not store near the fire' or 'not in the sun', whereas for the small cross, the comment was that the fire or the sun does not reach the tablets and that the medicines should not be stored where the sun can reach the car or the fire can reach the tablets. They also commented that the sun does not reach the medicines so the medicines are good to use.

The thick, large black cross was again adopted for Version 2, but when all these pictograms were included into a concentrated area within the PIL, the crosses overwhelmed the storage visuals, which seemed to fade into the background. The same thickness of the cross was retained, but the black was modified to a shade of grey (Final Version).

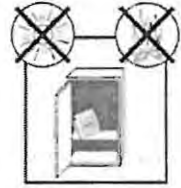







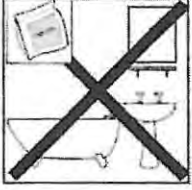



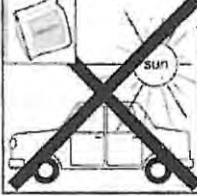



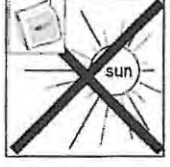

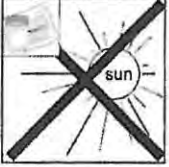




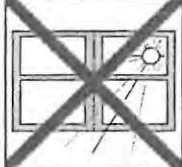




The findings in this study emphasize that the effective use of prohibition signs is associated with activities that are generally recognised as being forbidden, for example, patients are usually told not to store medicines in humid, heated areas; common examples of heat sources being fire and sun. In a South African study, in which prohibition signs were tested in a literate and low-literate population, the majority of the participants in both groups correctly interpreted the negation meaning of the cross, although combination of visuals illustrating commonly discouraged activities such as smoking and alcohol improved the interpretation [80].

All pre-Final Versions included an insert in the top left corner showing different medicine packaging. Version 2 attempted to illustrate the type of containers used locally for the distribution of ARVs. This element was deemed unnecessary and was deleted from the Final Version as the relevant section in the PIL was headed: 'Do not keep your ARVs...' followed by all these pictograms.

The image of the sun in the 'not in the car' and 'not in the sun' pictograms included the word sun. However, this text was ignored during interpretation and the recommendation was to remove it and this was implemented in the Final Version.

The image of the window was the only one that was modified as some participants took it to be a door. The entire window was shown in the Final Version, and it was drawn to resemble the design of window commonly seen in local houses.

Table 3.3: Modification of storage pictograms

Name	Modified pictogram	Version 1	Version 2	Final Version tested quantitatively
Store in a dry cool place				
Keep all medicines away from children				
Not in the bathroom				
Not in the car				
Not in the sun				
Not by the windowsill				
Not by the fire				

^aTested in Step 3 group interview

^bTested in Step 4 group interview

3.4.1.3 Miscellaneous pictograms

The pictograms showing medicine-taking instructions were modified from previously designed and tested ones [118]. The remaining two were drawn from posed photographs taken for this study. All the modifications of the miscellaneous pictograms are tabulated in Table 3.4.

Take your medicines with a full glass of water

Swallowing medicines is often made difficult with HIV/AIDS disease progression and with opportunistic infections affecting the mouth and throat [23,175,176]. Taking water with a full glass of water may facilitate the smooth passing of tablets down the throat and may aid in the prevention of ulcers. The initial image had a full glass of water with an elliptical water meniscus similar to the mouth of the glass, and two tablets and one capsule were shown.

This image was tested in the group interview. There was confusion as to how many tablets were supposed to be consumed with the water. Due to the existing distance between the tablets and the capsule, one female participant thought the image suggested that the tablets have to be taken together followed by the capsule a while later. The image was further modified to yield the Final Version. In this version the design team decided to make the meniscus irregular and included water movement lines. The tablets and the capsule were removed from this image.

Take your medicines with food

The foundation of this image was a previously designed and tested one consisting of a plate of shaded food and a spoon with three tablets drawn on the right upper corner [89]. The tablets were eliminated from the image and the shading on the food was removed (Version 1). Even though the food in Version 2 in the plate was recognised as such, the lack of identifiable food resulted in participants suggesting that it was pumpkin, beans, potatoes or soup. After discussion, the design team modified the bland food image to include more recognisable staple foods commonly eaten in South Africa, such as beans and maize meal porridge.

Take your medicines once/twice daily

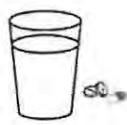





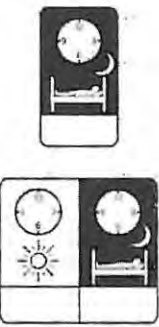
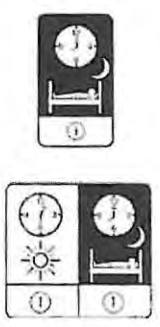
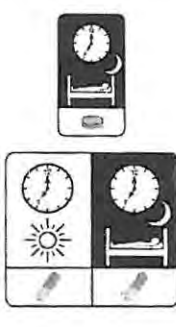
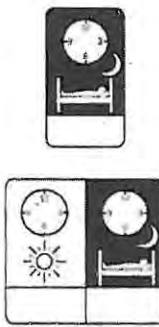





Mwingira [118] reported high understanding and interpretation of 95.8% and 95% for the 'take your medicines once daily' and 'take your medicines twice daily' pictograms, respectively. Lupton and Miller [177] described silhouettes as 'the dominant strategy behind the language of international pictures, suggesting an objective shadow of material reality, a schematic index of fact'. The authors suggested that silhouettes illustrate the natural cast of the entity in a picture, in this instance a moon, and a person lying on a bed, and hence they are easily recognisable. A clock-face was included to indicate times at which medicine should be taken.

In Version 1 of each image, clock hands were added and the number 1, in a circle, was written to indicate the number of tablets to be taken. The design team felt that it would be preferable to illustrate the actual shape of the ARV tablets or capsules, so photographs were taken and appropriate tablet/capsule shapes replaced the number (Version 3). In the 'twice daily' image, the clock hands were set to the same time to show that the particular ARV has to be ingested 12 hours apart at the same time every day.

Sources to buy medicines

Patients may obtain or buy medicines from a variety of sources but often neglect to inform their HCP of this. ARVs are involved in many drug-drug interactions and although there are reports of interactions with traditional medicines, very little evidence-based information is available [178]. The WHO defines traditional medicines as health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being [179,180]. In South Africa it is estimated that approximately 60-80% of the population visit a traditional healer prior to visiting clinics [181-184].

Table 3.4: Modification of miscellaneous pictograms

Name	modified pictogram	Version 1	Version 3	Final Version tested quantitatively
Drink medicines with a full glass of water	^a 		-----	
Take your medicines with food		^b 		-----
Take your medicines once daily/twice daily	^a 			
Sources to buy medicines	^b 		-----	
Do not share your medicines	^{b, c} 	-----	-----	^{b, c} 

^aTested in Step 3 group interview

^bTested in Step 4 group interview

^cBoth tested quantitatively

A spaza shop is a small general dealer commonly seen in the township areas of South Africa where a large proportion of black residents live. Medicines such as paracetamol, aspirin and antacids may be sold in these spaza shops. Photographs were taken of clinics and a spaza shop and the initial images were drawn from these. The image of the spaza shop was clarified by adding the word 'Spaza' in large letters in the initial sketch. Participants commented they often bought aspirin from these types of shops thus easily recognised the image as being in a township from the heavily burglar-proofed windows and door.

The initial sketch of the clinic was easily recognised, although participants mentioned that if the word 'clinic' had not been included, they would have thought that the building was a school or church. They suggested that the traditional hospital symbol of a cross contained in a circle should be included on the sign. To avoid confusing different types of buildings, the clinic building was removed and replaced with just a sign with the word 'clinic' and a cross in Version 1 on it. The same concept was used to represent a pharmacy in Version 1.

It is important for patients to realise that they should mention all medicines bought from any source including supermarkets. In South Africa, plastic bags are used as carry bags and are often referred to as 'amaCheckers', with *Checkers* being a well-known supermarket that sells affordable food. Initially a plastic bag with the name and logo of this supermarket was used to represent this source for purchasing medicines in Version 1. During the group discussion, participants said that this image suggested that they should keep or carry their medicines in plastic bags when coming from the clinic or doctor. They recommended that a sign with the names of the three big supermarket chains be drawn instead, a suggestion which was implemented in the Final Version.

The image of the sangoma, who is a traditional healer, was easily recognised. The Final Version consisted of a composite pictogram containing five different images, each representing a different source for obtaining medicines.

Do not share your ARVs

Sharing of prescription medicines is common among patients irrespective of illness and economic status. Interestingly, medicine sharing is more prevalent in women than men, making them potentially more likely to share their ARVs resulting in low adherence and sub-minimal efficacy [185].

The initial sketch was drawn from a posed photograph and illustrated two women, with one placing a tablet onto the cupped hands of the other. The hand position of the woman receiving the tablet is specific to this culture and is a respectful pose typically adopted when receiving something from another person. Humans are generally easy to recognize in images, irrespective of art style [80] but although the two women were easily identified, their relationship was perceived as being that of a caregiver and a patient rather than of two friends or family members sharing medication. A small tablet was drawn on the hands of the 'recipient', and above the hands a prohibition cross was drawn. Participants commented on the small size of the tablet which made it hard to identify and there was a possibility for misinterpreting this image.

The image was drastically modified to show only the hands in the Final Version. Even though individual isolated body parts are reportedly difficult to recognise [89,112,164] the hands were clearly drawn and were well understood. A pair of cupped hands was shown receiving tablets from a hand pouring them from a medicine packet. A grey prohibition cross was drawn above this image.

CD4 count

The figures drawn for the lipoatrophy image were used unmodified but were swapped to start with the 'sickly' thin person representing a pre-ARV state progressing on to the 'healthy' person representing a return to better health after ARVs were started. This pictogram was included to support the notion that ARVs help to boost the immune system and improve overall health. It is vital for patients to know their CD4 count and understand what it means in relation to viral load and ARV consumption. This image was included to try and educate participants about this concept.

3.4.2 Quantitative evaluation of pictograms

3.4.2.1 Demographic characteristics

In Step 3, 45 people were approached to participate in the study; five declined. In Step 4 all 40 people who were approached agreed to be interviewed. All 80 (100.0%) participants were Black isiXhosa speaking adults aged 18 years and above (Table 3.5). Females constituted 58.8% of the participants. More than 90% of the participants were aged 30 and above. Fifty-three (66.3%) participants had grade 7 and below education. Four of the 80 participants could not tell the time and a further four stated that they could only tell time from a digital clock face. Fifty-eight participants (72.5%) were unemployed at the time of the study.

Table 3.5: Demographic data from Step 3 and Step 4

Demographic Parameters		Participants N (%)	
		Step 3 (N= 40)	Step 4 (N =40)
Gender	Male	15 (37.5)	18 (45.0)
	Female	25 (62.5)	22 (55.0)
Age	18 – 29	0 (0.0)	5 (12.5)
	30 – 39	3 (7.5)	13 (32.5)
	40 – 49	16 (40.0)	11 (27.5)
	≥ 50	21 (52.5)	11 (27.5)
Education	≤ Grade 3	12 (30.0)	9 (22.5)
	Grades 4 – 7	19 (47.5)	13 (32.5)
	Grades 8 – 10	9 (22.5)	18 (45.0)
Employed	Yes	9 (22.5)	13 (32.5)
	No	31 (77.5)	27 (67.5)
Clock face	Yes	36 (90.0)	36 (90.0)
	No	3 (7.5)	1 (2.5)
	Digital time only	1 (2.5)	3 (7.5)

3.4.2.2 Side effect pictograms

Table 3.6 presents the frequency of correct interpretation of the pictograms as well as comments on incorrect responses. Six of the 12 side effect pictograms achieved the 85%

ANSI criterion, with two of these being correctly interpreted by all 40 participants (in each stage).

All participants in Step 3 understood both the nausea and vomiting pictogram and all the Step 4 participants understood the lactic acidosis pictogram. Responses to the latter image were analogous to those of nausea and vomiting, although in some cases the woman was taken to be either 'drunk', 'pregnant' or vomiting due to an allergic reaction caused by the medicines. The elements that contributed to the understanding of the image were the hands on the stomach, which was interpreted as stomach pain, the vomit which was easily recognised by participants, and the bucket. Of the forty participants interviewed, thirty-seven participants recognised that the woman is 'fat'. The abdominal pain pictogram was also exceptionally well understood with only one participant misunderstanding by stating that the image was of a person with a bandaged broken arm.

The headache image was well understood mostly due to the hands being positioned on the temples. However, some participants interpreted it as a 'person holding head because of pain', 'a poor person crying', 'thinking person', and 'a stressed and worried person'; one participant stated that when taking medicines a person should not think too much. Only five participants paid any attention to the lightning bolts around the head, with two of the five interpreting them as fire on the head, one participant stated that they represented dizziness and the remaining two did not understand the image at all because of the 'things' on the head.

A few participants interpreted the skin rash to represent either an allergic reaction or pimples with one participant stating that the man was crying because of painful pimples on the body.

For the diarrhoea image, two participants were unable to identify the images used to represent the diarrhoeal matter, stating that the person was either just sitting on the toilet seat or was constipated. Of the 33 (82.5%) participants who correctly identified this image, the majority associated the hands on the stomach as an emphasis that the person is also experiencing stomach-ache and cramps.

Table 3.6: Interpretation of side effect pictograms











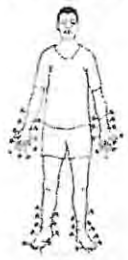




Name	Pictogram	Correct N (%)	Comments
Nausea and vomiting		40 (100.0) ^a	- Person is drunk or pregnant
Lactic acidosis		40 (100.0) ^a	- Person is allergic to medicines - Woman vomiting because she is drunk - She is pregnant and is experiencing morning sickness
Abdominal pain		39 (97.5) ^a	- Person has hurt his arm and it is bandaged
Headache		38 (95.0) ^a	- Person stressed/worried/thinking - Person is crying because of poverty
Skin rash		37 (92.5) ^a	- Person has allergies/pimples - Man crying because of pimples
Diarrhoea		37 (92.5) ^a	- Man is constipated/stomach is painful - Person just sitting on the toilet - Person has cramps
Lipoatrophy		33 (82.5)	- Arrow points to the back of second woman - Arrow shows something is growing on the back of the lady - Second woman has TB
		33 (82.5)	- Both men look healthy but second one is skinny - Second man looks hungry - The first man is fat and the second is thin - The second man does not take his medicines

Table 3.6 (cont.)

Name	Pictogram	Correct N (%)	Comments
Lipodystrophy		32 (80.0)	<ul style="list-style-type: none"> - This is same person trying to get better - These are two different people - Second woman looks like she is coughing - Second woman is pregnant
		28 (70.0)	<ul style="list-style-type: none"> - These are two different people facing the same direction - The second man has kwashiorkor - The second man is slouching
Peripheral neuropathy		29 (72.5)	<ul style="list-style-type: none"> - Veins are coming out to let warmth out - Man has skin acne/blisters/ painful joints/allergic reactions
		23 (57.5)	<ul style="list-style-type: none"> - Man is being stabbed - Person is well after taking medicines - Arrows represent veins - A shaking dizzy person - A person being shocked - A burning sensation
Fever		29 (72.5)	<ul style="list-style-type: none"> - Check for headache/pain in the forehead - Child crying - Person praying for better health - Person thinking a lot
Dizziness		26 (65.0)	<ul style="list-style-type: none"> - Twirl is a rope/stress - Woman standing under a light - Headache and the twirl emphasises pain
Nightmares		19 (47.5)	<ul style="list-style-type: none"> - Person with mental problems - Person has been stabbed - This is a dead person - Pregnant woman dreaming - All of the things in the bubble are happening to his eye - Eye problems; the left one is popping out

^aPictograms that achieved the ANSI criterion of 85%.

Both the female and male versions of the lipoatrophy image narrowly missed the recommended 85% correct interpretation by only 2.5%. Interestingly, these images were better understood than the lipodystrophy images. Participants paid more attention to the arrows in the female version of the lipoatrophy side effect. It has been shown that arrows slightly improve recognition of movement, and passage of time but low literate participants focus a lot more on these when they perceive the picture to be difficult [186]. This may offer an explanation as to why more attention was paid to the arrows in the female version of lipoatrophy unlike the other three fat redistribution pictures. Responses to the use of the arrow in this image were 'the arrow is pointing to the back of the thin woman' and one participant said that 'the arrow shows me that there is something growing on the back of the thin woman'. One participant commented that the thin woman was suffering from TB.

Both the female and male versions of the lipodystrophy pictogram were generally fairly well understood. Thirty-two (80.0%) participants correctly interpreted the female version of the lipodystrophy pictograms while 28 (70.0%) of the participants correctly interpreted the male version. Most participants were able to understand the concept of physical changes occurring to the male and female bodies. However, the arrow, which was included to communicate the idea that the changes are occurring over time to the same person, was often ignored resulting in the misinterpretation that these were two different people looking in the same direction. In one study by Dowse and Ehlers [164], a directional arrow showing the movement of the medicine into the mouth was ignored by participants. This highlights that arrows, irrespective of whether they are showing direction, communicating the passage of time, or pointing to draw the viewer's attention, are often ignored as low literate individuals tend to look for identifiable objects to understand images.

Responses to the male version of lipodystrophy included the man having kwashiorkor or the second man in a slouching pose. It is possible that the female version of the lipodystrophy pictogram was incorrectly interpreted because in females the lipoaccumulation is concentrated around the breasts and abdomen [187] and can be difficult to visualise as some women naturally have larger breasts and a larger abdomen. Several participants stated that the second woman was pregnant and one participant said that this woman looks like she is coughing.

All four lipodystrophy and lipoatrophy pictograms were excluded after discussions with the doctors and nurses caring for people taking ARVs as they felt that patients would be scared off taking the drugs and the images could adversely affect adherence. Literature has suggested that appearance-related side effects contribute towards greater non-adherence because of the stigma that may arise [56,160].

The peripheral neuropathy pictogram presented unique interpretation challenges as in the target population the phrase 'pins-and-needles' is rarely used. This sensation is often referred to as 'cramps'. Twenty-nine (72.5%) participants correctly interpreted the image of the man with pins around the extremities, as suggesting either numbness, pain, burning sensation, cramps or pins-and-needles. One participant pointed out that the medicine may be unsuitable for the man in the picture and is now causing pain, while another participant said that 'the veins were coming out to release the warmth' in the affected area. This metaphorical representation of a bodily experience was surprisingly well understood by these low-literate participants. Other interpretations suggested that the person was experiencing skin acne or blisters and 12 participants mentioned that the man has joint pain. Only five participants identified the pins but did not understand their importance in the image.

Twenty-three (57.5%) participants correctly understood the peripheral neuropathy image of a man with arrows drawn around the extremities. At first glance, the majority of the participants stated that the arrows suggest that the man is being shocked but after a good look at the image, the participants changed their minds. Of the 17 participants who incorrectly identified the pictogram, seven stated that they did not understand the image, while others proposed that the arrows are veins or that 'the person has been stabbed' or 'the person is well after taking medicines' and that the image illustrates a dizzy, shaking person.

The pictogram depicting fever was misinterpreted by 11 participants with misinterpretations including: 'a person checking for a headache and for pain in the forehead', 'a crying child who is in pain', and 'the man in the picture crying because he is poor'. The lines depicting heat radiating from the head were variously described as 'things coming out of the head' and 'a person praying for better health'. This image makes use of a visual convention of wavy lines to depict heat, and as such is a

convention that has to be learnt, making it a more challenging image to understand [80,86,186]. Fever occurs both as a side effect of ARVs but more commonly with the occurrence of opportunistic infections in HIV/AIDS. It was not included as an image depicting a side effect in the final PIL.

The pictogram depicting dizziness was correctly interpreted by almost two-thirds (26; 65.0%) of the participants. This can be attributed to the visual conventional of a twirl which was used to represent light-headedness and dizziness and therefore contributed to the difficulty in interpreting this image [86]. The twirl was thought to be a rope or a light and almost a third of the participants thought the person had an extremely painful headache, with the twirl emphasizing the pain. Other participants suggested that the woman in the pictogram was stressed, worried or deep in thought rather than feeling dizzy.



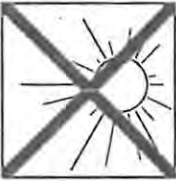



The nightmares pictogram was the most poorly understood with just under half of the participants 19 (47.5%) correctly interpreting it. Problems with interpretation were associated with the dream bubble as participants were able to identify the objects in the bubble but were not able to understand the significance of these objects. Abstract concepts, in this case a dream, are difficult to illustrate in pictures without a verbal explanation as dreams are usually full of changing images, experiences and motion whereas pictures are static [186]. Misinterpretation of this pictogram included a mentally sick person, a person stabbed with a knife, a pregnant woman dreaming and a dead person. Two participants associated the last circle of the dream bubble as an eye. One participant mentioned that the eye was popping out while the other stated that all the objects in the dream bubble were happening to the left eye. The results for this pictogram support those of Carstens *et al.* [80] in that callouts were found to be poorly understood in the low literate participants in South Africa.

3.4.2.3 Storage pictograms

Four pictograms in this series surpassed the 85% ANSI criterion implying that these images were suitable for general application as they were easy to comprehend (Table 3.7). These include 'keep medicines away from children' (100.0%), 'not by the window' (92.5%), 'not in the sun' (90.0%) and lastly, 'not in the car' (87.5%). Even though the

majority of the participants correctly interpreted the window in the 'not by the window image' two stated that the window resembles a door. For the 'not in the car' pictogram one participant stated that the sun in the image was the moon. Two participants felt that storing medicines in the car poses a security risk as people may get into the car and may take them.

Table 3.7: Interpretation of pictograms depicting storage instructions

Instruction	Pictogram	Correct N (%)	Comments
Keep all medicines away from children		40 (100.0) ^a	<ul style="list-style-type: none"> - Mother opening cupboard - Mother holding a locker - Mother opens cabinet because baby wants medicines - Pills in the fridge
Not by the window		37 (92.5) ^a	<ul style="list-style-type: none"> - The window is a door
Not in the sun		36 (90.0) ^a	<ul style="list-style-type: none"> - Put medicines in the sun - The sun looks like a clock
Not in the car		35 (87.5) ^a	<ul style="list-style-type: none"> - The sun looks like the moon - Risk of medicines taken from car by other people
Not in the bathroom		33 (82.5)	<ul style="list-style-type: none"> - Medicines not stored in bathroom because of contamination from other chemicals e.g. soaps - Medicines risk being taken by other people who enter bathroom
Not by the fire		32 (80.0)	<ul style="list-style-type: none"> - The fire is a traditional plant - The fire is a flower

^aPictograms that achieved the ANSI criterion of 85%.

Thirty-three (82.5%) participants correctly interpreted the pictogram illustrating 'not in the bathroom'. Four participants could not identify the objects in the pictogram making it difficult to connect the concept of not storing medicines in a humid environment such as the bathroom, which could possibly affect the viability of the medicines. Two other participants felt that medicines should not be stored in the bathroom because of possible contamination from chemicals e.g. soaps, while three participants said that the image suggests that it is not advisable to store medicines in the bathroom because it can be taken by anyone entering the bathroom.

The lowest interpretation (32; 80%) was for the 'not near the fire' pictogram. Of the eight participants who did not understand this image, two stated that the fire was a traditional plant, three said it was a flower and one misinterpreted this image as 'medicines should not be mixed with traditional medicines'.

The prohibition cross used in this pictogram series supports the findings that the prohibition meaning is easier to understand when it is linked with generally prohibited entities [80,186]. From discussions with the participants, it was clear that they knew and understood from the pictograms that medicines should not be stored in the heat and in humid areas.




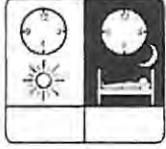


3.4.2.4 Miscellaneous pictograms

Three out of the six pictograms in this section achieved the ANSI 85% criterion, although none achieved 100% interpretation (Table 3.8). Only one participant felt that the image depicting places to obtain medicines was difficult to understand. Another participant could not recognize the sangoma and thought it was a dead person. Thirty-seven (92.5%) participants correctly identified all objects and understood the image in relation to medicines.

The 'medicines with a full glass of water' pictogram was correctly interpreted by 35 (87.5%) participants with one participant seeing the full glass as two pails of water, one behind the other. The remainder of the participants interpreted the image as 'take three tablets with a glass of water' or 'two buckets one inside the other next to three tablets'.

The two pictograms, 'take 1 table at night' and 'take 1 tablet in the morning and 1 tablet at night' were reasonably understood by the participants, with correct interpretations of 80% and 85% respectively. The lack of understanding may have been due to the absence of clock hands on the clock face.

Table 3.8: Interpretation of miscellaneous pictograms

Instruction	Pictogram	Correct N (%)	Comments
Sources to buy medicines		37 (92.5) ^a	- Sangoma is a dead person
Drink medicines with a full glass of water		35 (87.5) ^a	- Take three tablets with a glass of water - 2 pails one behind the other - 2 buckets one inside the other and three tablets
Take your medicines once daily at night/twice daily		32 (80.0)	- Take one tablet and sleep - Take medicines at 3, 6, 9 and 12 - A sick person sleeping in bed
		34 (85.0) ^a	- Take medicines 4 times a day when it's hot and take medicines at the same time at night - Take medicines at 6 in the afternoon then at 8 at night - The moon is a spoon
Do not share your medicines		23 (57.5)	- Do not take pills from another person's hand because hands are dirty - Do not put medicines on open hands, you must use medicine bottles - You need to take medicine with water and this is not showing water therefore it is wrong
		20 (50.0)	- There is a drop of blood on the recipient's hand - Woman on the left is a nurse

^aPictograms that achieved the ANSI criterion of 85%.

Half of the participants correctly identified the 'do not share your medicines' image showing two people. Contrary to previous research, which has shown that isolated body parts may cause confusion [89,112,164], 23 of the participants (57.5%) correctly understood the image showing only the hands. With the former pictogram, the focus was on events occurring with the hands, and the details were too small to detect. Many participants thought that the person on the left was a nurse because of the hairstyle and the collar, resulting in the interpretation that nurses should not give patients their medication. One of the participants thought the tablet on the receiver's hand was a drop of blood, interpreting this pictogram as do not touch other people's blood.

In the image showing hands only, 23 participants stated that it illustrated hygiene instructions, with the image suggesting, 'you cannot take pills from another person's hand because hands are not clean'. Other responses to this image were 'medication cannot be put in open hands and given to each other when not in bottles', 'you cannot have medicines in your hands when you are holding something else in your hands', and 'it is wrong to take these because the doctor did not give water with the pills'. It was observed that some of the participants who correctly interpreted this image also associated it with hygiene instructions as mentioned above.

3.4.2.5 Association between pictogram interpretation and selected variables

From Table 3.9 it is evident that gender did not significantly influence the understanding of pictograms tested in both Steps. Results for gender were not consistent between the two Steps. In Step 3 females correctly interpreted a higher number of pictograms (13.4) than males (12.4), whereas this trend was reversed in Step 4, with 9.0 for females and 9.6 for males. In Step 3, there were more females who had studied beyond grade 4, namely 20 females *versus* 8 males and this may account for the higher results from the females.

The total number of pictograms correctly interpreted was not significantly influenced by age, although in Step 3 a definite trend was observed with a decrease in the mean number of pictograms interpreted correctly with an increase in age. This could be due to the increased exposure of the younger generation to visual material via the television, popular magazines and the internet. Interestingly this trend was not evident in Step 4

where the 30-39 age group correctly understood 9.4 of a total of 12 pictograms, followed by a mean of 9.3 pictograms interpreted correctly in the oldest age group of 50 years and above. This result contradicts previous research which found that people in the older age groups are generally less successful in correctly interpreting visual material [118].

Table 3.9: Association between the number of pictograms correctly interpreted and selected variables

Variables	Step 3			Step 4		
	Participant N=40	Mean±SD	p-value	Participant N=40	Mean±SD	p-value
Gender						
Male	15 (37.5)	12.4 ± 2.2	0.086	18 (45.0)	9.6 ± 1.7	0.291
Female	25 (62.5)	13.4 ± 1.4		22 (55.0)	9.0 ± 1.8	
Age						
18-29	0 (0.0)	-----	0.188	5 (12.5)	9.2 ± 2.4	0.980
30-39	3 (7.5)	14.6 ± 1.5		13 (32.5)	9.4 ± 1.6	
40-50	16 (40.0)	13.2 ± 1.7		11 (27.5)	9.0 ± 1.5	
>50	21 (52.5)	12.6 ± 1.8		11 (27.5)	9.3 ± 2.1	
Education						
≤ Grade 3	12 (30.0)	11.7 ± 1.8	0.001 ^a	9 (22.5)	8.22 ± 1.8	0.129
Grade 4-7	19 (47.5)	13.1 ± 1.5		13 (32.5)	9.46 ± 1.3	
Grade 8-10	9 (22.5)	14.6 ± 1.0		18 (45.0)	9.67 ± 1.9	

^aSignificant difference level at 5% (p<0.05)

In Step 3, education had a highly significant effect (p<0.001) on the average number of pictograms interpreted correctly, whereas in Step 4 no significant effect was found (p=0.129), although a similar trend in increase of number of pictograms was observed. As would be anticipated, pictogram understanding improved with an increased education level, a finding supported by previous research [164].

3.5 Conclusion

From this phase of the study, it was obvious that an iterative design, modification and testing process for pictogram development is essential to achieve suitable images. This process also highlighted that the same image may yield a variety of responses from different individuals in the same target population. Both the group interviews and the individual interviews afforded invaluable insight into the cultural appropriateness of the images as well as the suitability of using these pictograms to educate the public about medicine-taking instructions, side effects of medicines and correct storage of medicines.

CHAPTER 4

DESIGN AND MODIFICATION OF PATIENT INFORMATION LEAFLET

4.1 Introduction

The previous chapters presented the background and significance of this research project. From the literature, it is evident that there is a need for both oral and written information to be supplied to patients in order to improve medicine-taking behaviour [5]. PILs have been proven effective in conveying this medicine information to patients [5,10,13].

Ideally, the HAART adherence level is required to be more than 95% to achieve a low viral load and viral suppression [12]. With factors such as side effects impacting negatively on adherence there is a need for written information about the occurrence, treatment and reporting of these. Regimen 1a, the most widely used HAART regimen consists of stavudine, lamivudine and efavirenz, which cause side effects, such as, nausea and vomiting, lipodystrophy, diarrhoea and nightmares. In this chapter, the methodology of designing and evaluating written information on HIV/AIDS treatment and their side effects are described.

4.2 Objectives of Phase 2 of the study

The objectives of Phase 2 of this study were:

1. To modify a previously developed and tested ART Regimen 1a PIL and make it more applicable for a low-literate population.
2. To evaluate the format, content, and general design of the ART regimen 1 a PIL.
3. To evaluate comprehension of both the text and pictograms in the PIL.
4. To assess the impact of incorporated side effect pictograms on the understanding of the PIL.
5. To investigate the relationship between various demographic variables and PIL understanding.

4.3 Methodology

4.3.1 Study site and population

The study site and population sample were previously described in Chapter 3, Section 3.3.4. The main ARV rollout site in Grahamstown is based at Settlers Hospital, the only public hospital in the town. The clinic, established in 2003, is called Masonwabe HIV/AIDS Clinic, with Masonwabe being an isiXhosa word meaning 'Let's be happy together'. This clinic is associated with seven satellite clinics within the Grahamstown region. Masonwabe Clinic complies with the South African guidelines for initiating ARVs and the specific process used at this clinic is shown in Figure 4.1.

The PIL described in this study could be supplied to patients in Phase 2 of the initiation process (Figure 4.1) after they have demonstrated that they are adherent to co-trimoxazole and are being initiated on ARVs.

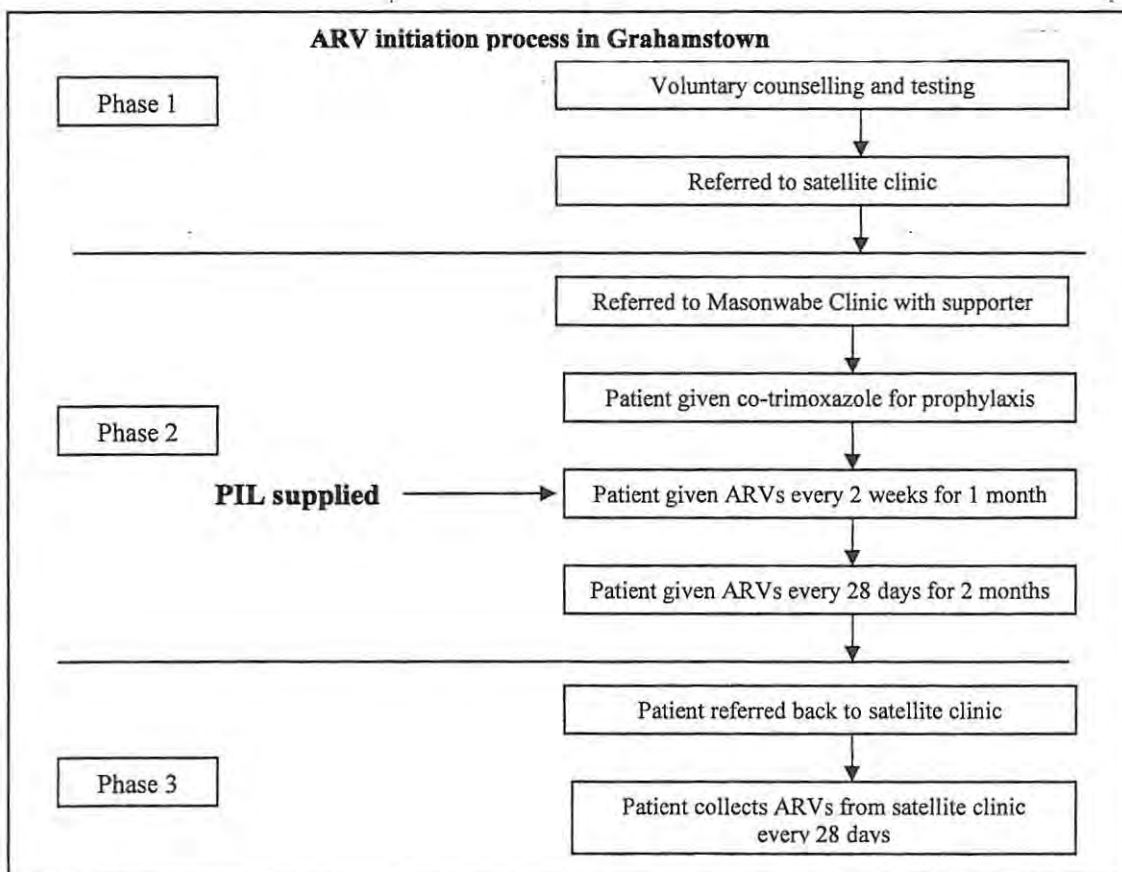


Figure 4.1: Flow chart describing the process for initiating ARVs in Grahamstown

4.3.2 Design and modification of the PIL

A previously designed and tested PIL for Regimen 1a was used to develop the ART PIL used in this study [118]. For the purpose of this study 'Foundation PIL' refers to the PIL designed and tested by Mwingira [118] which served as the basis of the current PIL (see Appendix C0). The PIL used in this study is referred to as 'Regimen 1a PIL'. The Foundation PIL was extensively modified: additional pictograms were included, selected pictograms tested in Phase 1 were incorporated in the leaflets and most of the written information was removed to simplify the PIL and create space for the insertion of the pictograms.

Informal discussions were held with HCPs working at the Masonwabe HIV/AIDS Clinic to establish what information is routinely given to patients who are being initiated on ARVs. The HCPs were shown the Foundation PIL to assess the quality and quantity of the information. Feedback indicated that the information was adequate and similar to the information routinely given to patients during consultation prior to initiation of ART.

The modifications made to the Foundation PIL are described below.

General modifications

- All headings in Regimen 1a PIL were personalised by use of words such as 'your' to produce a more interactive PIL.
- More bullet points were used in Regimen 1a PIL to create space and to make the leaflet easier to read with an attractive layout.
- The term 'medicines' referring to ARVs in the Foundation PIL headings and text was changed to 'ARVs' to specify the medicines referred to in the leaflet e.g., 'what your medicines are used for' was replaced by 'what your ARVs do'.
- Pictograms were used in only three sections in the Foundation PIL while in Regimen 1a PIL they were used throughout the PIL.

Specific modifications within the PIL sections

- **What is in this leaflet:** In the Foundation PIL, this section was an introductory section explaining the purpose of the leaflet. It was removed and a sentence summarising the purpose of the leaflet was included in the title section of the Regimen 1a PIL.
- **What your medicines are used for:** Long sentences explaining the indication of ARVs were used in the ART PIL. In Regimen 1a PIL, a short bulleted introductory section was used.
- **Before taking your medicines:** The ‘taking other medicines’ sub-section in ART PIL, which gave information about what should be done once a person has commenced ART, was removed.
- **While taking these medicines:** After consultation with HCPs, who have frequent interaction with HIV/AIDS patients, the information about alcohol consumption in the ART PIL was removed. The HCPs mentioned that the patients would rather stop taking ARVs than stop using alcohol.
- **Possible side effects:** In Regimen 1a PIL the heading was changed to ‘Side effects’.
- **After taking your medicines:** In the Foundation PIL, this section explained storage and disposal instructions. The heading was changed in the Regimen 1a PIL to ‘How to store your ARVs’ and focused on both correct and incorrect storage instructions. Instructions on the disposal of medicines were eliminated from Regimen 1a PIL.
- **Things to remember:** This section in the Foundation PIL was removed. In the Regimen 1a PIL, a short section commenting on the importance of using condoms was included at the end of the PIL.
- **Production description:** From a previous study [118], it was evident that patients do not pay attention to this section, they do not understand the information and feel that it is irrelevant thus this resulted in this section being removed.

The format, layout and insertion of pictograms in the PIL were done in collaboration with the graphic designer and illustrator and involved a multistage, iterative process with many modifications before the final version was accepted for testing. The PIL

consisted of an A4-size back-to-back page, each side with three columns (Appendix C2).

4.3.3 Format of the PIL

The PIL consisted of the following seven sections:

- **Title section:** Provides the collective name of the medicines and regimen referred to in the leaflet. This section also has a sentence describing the purpose of the leaflet used.
- **Introductory section:** Explanation on the indication of the medicines is offered in this section.
- **Before taking your ARVs:** Gives warnings, precautions, and advises patients to tell HCPs about their health history such as allergies, current medicine therapy and pregnancy prior to the initiation of ARVs.
- **How to take your ARVs:** These are instructions on dosing schedule, medicine-taking instructions and adherence.
- **While taking your ARVs:** Highlights the information patients should tell HCPs concerning other medicines bought from diverse sources which are taken concurrently with ARVs. It also creates awareness about medicine sharing and missing doses. Pictograms of possible places where medicines may be purchased are included in this section.
- **Side effects:** A simplified definition of side effects is offered along with advice on what actions to take when these are experienced. Lists of some common side effects and their possible timeframe of occurrence are given.
- **How to store your ARVs:** Both appropriate and inappropriate storage conditions are mentioned and a pictogram for each was included.
- **Auxiliary:** Additional information on safe sex, condom use and adherence are provided as a reminder of how patients can protect themselves and their loved ones.

Four different formats and layout of the PIL were produced:

- 1) Landscape PIL without side effect pictograms : Control (Appendix C1)
- 2) Landscape PIL with side effect pictograms: Experimental (Appendix C2)

- 3) Portrait PIL without side effect pictograms (Appendix C3)
- 4) Portrait PIL with side effect pictograms (Appendix C4)

4.3.4 Qualitative evaluation of the PIL

Three separate group interviews were conducted: one with representatives from the target population, a second one with patients and the third with HCPs. The purpose of these three interviews was to evaluate the PILs for information appropriateness, suitability, and layout and format. Pictogram size, interpretation and cultural acceptability were also assessed.

Each group interview lasted approximately an hour. In all three group interviews the participants were shown the four leaflets in the same order: firstly the landscape PIL with side effect pictograms, followed by the landscape PIL without side effect pictograms, then the portrait PIL with side effect pictograms and lastly the portrait PIL with no side effect pictograms.

In the first interview, the participants were isiXhosa speaking adults (two males and one female) who were not AIDS patients taking ARVs. None of the participants had attended formal schooling beyond 9 years and their age ranged between 25-56 years. The interviewer conducted this interview in the participants' first language.

The multi-disciplinary team working with HIV/AIDS patients at Masonwabe Clinic consists of doctors, nurses, assistant nurses, social worker, dietician, data capturer, pharmacists and lay counsellors. The lay counsellors ensure that patients understand the information given to them by doctors and nurses and translate information to minimize the language barrier. For the purpose of this study, any member of this multi-disciplinary team is referred to as a HCP. In the second interview, eight HCPs were present, although the group did not include a pharmacist, data capturer or a social worker. The interview was conducted in English.

The third interview was conducted in isiXhosa at the Masonwabe Clinic with four patients who had recently been initiated on ARVs. All of the patients had isiXhosa as

their first language with the highest education level being 7 years of formal education. There were three females and one male.

In the hour-long interview, the interviewer briefly informed the participants about the project and the leaflet content. It was explained that all four PILs contained the same information with the difference being in the layout. They were also told that in two of the PILs the side effect section had text only, while in the other two this section had both text and pictograms. The interviewer handed the first PIL to the participants to look at and read. Only once all participants had had a chance to see the same PIL was it discussed amongst the group. This same procedure was followed for all four PILs. Towards the end of the interview, the participants were shown two PILs of the same page setup (either portrait or landscape) and were asked to select their preference between those with or without side effect pictograms. They were then also asked to choose their preferred PIL layout between landscape and portrait orientation.

4.3.5 Survey instrument for quantitative data collection

The survey instrument was a four-page questionnaire consisting of four sections (refer to Appendix E3). In section 1, demographic data such as gender, age, education level and employment were collected. The ability to tell the time from a clock face was also evaluated.

In section 2, a short literacy test (refer to Appendix B) was administered to assess reading ability. Participants were required to read an English version of a medicine label for an oxytetracycline (Cotet[®]) suspension. Medicine information in South Africa is still largely available in English, hence the label was not translated. Eight questions relating to the medicine label were asked and a literacy rating calculated from the number of correct answers.

A series of 20 questions assessing the understanding of the PIL content appeared in section 3. Each question in this section was divided into two parts: the first part aimed at assessing whether the participant could locate the exact information in the leaflet, while the second assessed correct understanding of information. The understanding of the information was assessed by whether the participant was able to relay the information

provided in the PIL back to the interviewer in their own words. It was emphasised to the participants that they should not give their understanding according to previous information and knowledge about the disease and its therapy. The participants were requested to give responses strictly according to their understanding of the information provided in the PIL. The time taken to read the leaflet and the language in which the PIL was read were recorded.

Acceptability of the PIL was evaluated in section 4. Questions about PIL size, legibility, layout and use of pictures in leaflets were included. A succession of open questions was also asked in order to collect data on misunderstood words and pictures, general comments, format and layout. This section provided information about the improvement of PIL appearance, understanding and readability.

4.3.6 Translation of the PIL into isiXhosa

The translation of the PIL was a multistep process involving translation, proofreading and back-translation. In this process, experts in the African Languages Department from the Rhodes University School of Languages were requested to translate the PIL into isiXhosa. These experts were instructed to use colloquial, commonly used words and/or phrases without altering the meaning of the original PIL and to be cautious about the translation of medical terminology. Both the isiXhosa and English versions were handed to a professional nurse to read. Her first language was isiXhosa and she had regular interaction with patients on ARVs.

IsiXhosa, like many African languages, has different dialects and colloquial phrases that may be easy for one person to understand but difficult for another individual even though they are from the same ethnic group. It was necessary for the PIL to be user friendly but still maintain its professional state. The professionally translated isiXhosa version was back-translated into English to assess whether the intended meaning remained and to ensure that the PIL was appropriately readable and professional.

The translated PIL was assessed by asking two isiXhosa speaking individuals with tertiary education to back-translate the PIL to English and their respective comments

were similar to those of the nurse. The final isiXhosa PIL was formatted to match the layout of the English version.

4.3.7 Assessment of the PIL using objective readability tests

The English version of the PIL was tested for readability and suitability prior to quantitative testing. The tools used for readability evaluation were Fry, Flesch-Kincaid, SMOG and the Gunning's Fog test. To assess the suitability of the PIL, the SAM tool was used.

The Fry, Flesch-Kincaid and Fog readability formulae were used because of their accuracy and provision of results in terms of grade level. The Fry and Flesch-Kincaid tests have been widely used in reading literature, as they are able to assess sections within the PIL and give an estimate of the PIL's overall grade level [12]. However, it is uncertain whether the American grade level measurement is directly applicable in a South African context and because of this, the number of years spent in school was paralleled with American grade levels [118].

Due to its simplicity, the Gunning's Fog test is also widely used [188]. Unlike the other two readability tests, this test allows for any one specific section to be evaluated separately and may give an indication of problems in that section.

The SAM has been developed to assess the suitability of patient educational written and illustrative information materials [12]. This tool was appropriate in assessing suitability of the PIL in this target population and was used for identifying, during the design stages, the problems that may render the PIL unsuitable.

4.3.8 Quantitative evaluation of the PIL

Two PILs were evaluated, the Control PIL which was a landscape version of the PIL without side effect pictograms and the Experimental PIL which was also a landscape version of the PIL but included side effect pictograms. Eighty participants with the same inclusion criteria as those described in Section 3.3.4 were enrolled into the study. They were randomly allocated to receive either the Control or the Experimental PIL by use of a research randomiser [202].

4.3.9 The interview process

The same community healthcare workers involved in Phase 1 assisted in recruiting participants. All participants were approached in the same manner described in Section 3.3.10.

One of the community health workers introduced herself, her colleague and the researcher. The researcher briefly explained the project, the purpose of the interview and the process to be followed during the interview. The participant was then asked for information about formal schooling, eyesight and his/her ability to read. If the participant met all the inclusion criteria and agreed to continue, demographic data along with the ability to tell time from a clock face were collected.

A short literacy test was given to the participants at this point with the interviewer saying:

“I will now give you a medicine label to read and once you have finished reading it I will ask you questions. All the questions I ask you will be about the medicine label. If you are taking medicines, please do not give answers about your own medicines”.

Each participant was given an opportunity to read the label information after which eight questions were asked.

Both the English and Xhosa versions of the PIL were then offered to the participants to read. Once the participant had chosen the preferred language, the interviewer continued as follows:

“Now I am going to give you a leaflet to read. Please take your time to read it and then when you are done I will ask you questions about what you have read. Please tell me when you are finished reading it”.

When the participant had indicated that he/she had finished reading the leaflet, the time taken to do so was recorded and the interviewer continued with:

“I am now going to ask you questions about the information you have read in the leaflet. Please look at the leaflet and point to where you see the answer first before you give any answers to the question. Do not forget to keep looking on both sides of the leaflet, if you cannot see the answer on one side please turn the leaflet over. Please also remember that all the questions I am going to ask you are about the information you have read in the leaflet, do not give me answers about other medicines or your own medicines if you are taking any”.

Each question was marked as ‘located’ or ‘not located’ and as ‘correct’ or ‘incorrect’ depending on success in locating the information and supplying a correct answer. Answers to the questions did not require any prior experience in taking ARVs or any other medicines, as all the information was contained in the leaflet. Questions were phrased such that there was only one correct response.

Participants were then asked about the acceptability of the PIL, the length of sentences, and any words and pictograms not understood. Participants were also required to give their interpretation of the CD4 cell count pictogram which appeared in the ‘What your ARVS do’ section of the PIL.

The interview was concluded by asking the participant about PIL design (Figure 4.2) Firstly, the appearance of side effects as text only or as pictograms and text was investigated. The landscape PILs with and without side effect pictograms were shown and the interviewer then said:

“Both these PILs have the same information written the only difference is that one has side effects pictures and the other only has words and no pictures. Please take your time to look at both, when you are finished looking at both, please tell me which one you like and would prefer to read”.

Secondly the opinion of the PIL layout was examined, whereby the landscape layout was compared to the portrait layout. (If the participant was in the Control group they would compare the Control landscape PIL with a portrait PIL which had no side effect pictograms and if the participant initially received the Experimental PIL, they would compare the landscape Experimental PIL with a portrait PIL which had side effect pictograms).

The interviewer then handed two PILs to the participant, one landscape and the other portrait. The participant was asked to give their opinion on layout with the interviewer saying:

“Now please look at these two leaflets, the information written in it is the same. The only difference is that when you look at one you have to read from one side to the other side (pointing at the landscape PIL) but on the other one you have to read from top to bottom (pointing to the portrait PIL). Please look at both of them carefully and when you are finished please tell me which one you prefer”.

Figure.4.2: PIL design and layout comparison process

At the end of the interview, participants were asked if they had any other comments they would like to make about the leaflet. An honorarium of R30 was given to the participants to acknowledge their time, as well as their intellectual input. The flow diagram of the whole study outline is found in Appendix A1.

4.3.10 Data analysis

For the literacy test section, each question was weighted and the total literacy rating was scored out of 10. Due to the complexity of Questions 2.3 and 2.4, they were weighted as 2 points and the remaining questions as 1 point each. Question 2.3 was a numeracy related question, which required the participants to think and calculate the specific time to eat lunch, while in Question 2.4 they were required to understand the vocabulary used in the medicine label in order to give a correct answer. A literacy score was calculated according to the number of correct answers each participant achieved.

In Section 3, overall understanding of the information in the PIL was calculated depending on the number of appropriately located and correctly understood answers. Each question was weighted as 2 points, with one point being allocated for appropriately located answers and another point for correctly understood answers. A total understanding of the PIL was calculated based on the number of correct responses for both location and understanding. Pearson Chi-square tests were used to determine differences in understanding of the PILs with and without side effect pictograms. One way ANOVA and t-tests at the 5% level of significance were used to compare the relationship between variables such as gender, education and age with the understanding of individual questions.

CHAPTER FIVE

RESULTS

5.1 Introduction

The testing of patient information leaflets (PILs) is an invaluable process as it highlights the deficiencies of the material during the design and the assessment process and helps the designer to address the problem areas in the leaflet. It is vital that written medicines information be assessed for readability, suitability, acceptability and understanding [12,13,189]. Involving the intended target population in both the design and evaluation process has proven to be helpful in designing superior material [12,13].

In this chapter the results from the evaluation of the Regimen 1a PIL are presented.

5.2 Readability and suitability results

According to the Fry's readability test, the PIL had long words, which implied that it would be unsuitable to read. Most of words used in the PIL had an average of three syllables. However, acronyms were common in the PIL and each letter in an acronym is counted as one syllable, for example, ARV was counted as three syllables. A great deal of health-related and medicine-related information also has multiple syllables, for example stavudine, lamivudine, diarrhoea and HIV/AIDS. These terms and acronyms may have unfairly categorised the PIL as poorly readable.

On the Flesch-Kincaid readability test, the average number of words per sentence (ASL) was 11.2 and the number of syllables per word (ASW) was 1.72. The overall calculation resulted in grade level 8, meaning that the leaflet can be read by 50% to 75% of scholars who are in the 8th grade. In the SMOG test, there were 39 words which had three syllables or more. After the calculations, the overall readability of the PIL was 9.24, which suggests that every person in grade 9 would be able to read this PIL. When tested on the Gunning's Fog readability test, the PIL grade level achieved was 6.7, which implies that 50% to 75% of learners in grade 6 would be able to read the PIL.

The current government has, since 1994, been actively promoting education and literacy, therefore a large proportion of learners have progressed beyond grade 5. The *Ministerial Committee on Learner Retention in the South African Schooling System* [190] reports that the drop-out rate significantly increases from grade 10 and above. This grade was therefore taken as the cut-off one for an acceptable readability level for the PILs. All these tests, except for the Fry's readability test, show that learners who are in grade 6 to grade 9 should be able to read this PIL, demonstrating appropriateness for the target population.

The SAM tool was used to evaluate the suitability of the PIL. The percentage rating fell between the 70-100% acceptable range at 88.9%, representing superior material [12]. From the results of these objective tests, the PIL design, layout, content and readability were therefore found to be of a suitable reading level and of a high quality. The results of the SAM scoring sheet are illustrated in Table 5.1.

Table 5.1: SAM scoring sheet

Factor to be rated	Score	Comments
CONTENT		
Purpose is evident	2	'What your ARVs do'
Content about behaviours	2	'How to take your ARVs'
Scope is limited	2	Medicine taking behaviour only
Summary or review included	0	No summary
LITERACY DEMAND		
Reading grade level	1	Grade level, 6 -9 years of school
Writing style, active voice	2	Active voice
Vocabulary uses common words	2	Commonly used health terms
Context is given first	2	Consistent
Learning aids via 'road signs'	2	Headings and sub-headings
GRAPHICS		
Cover graphics show purpose	N/A	No cover
Type of graphics	2	Tested pictograms
Relevance of illustrations	2	Tested pictograms
List, tables, etc explained	N/A	No tables
Captions used for graphics	2	Explanation with pictograms
LAYOUT AND TYPOGRAPHY		
Layout factors	2	3 columns, black print on white paper
Typography	1	Upper case (capitals), lower case (small letters), italics and bold text
Subheads ('chunking') used	2	Sub-headings present with headings
LEARNING STIMULATION AND MOTIVATION		
Interaction used	N/A	One way instructions
Behaviours are modelled and specific	N/A	Information about medicines
Motivation, self-efficacy	2	Information organised into sub-headings
CULTURAL APPROPRIATENESS		
Match in logic, language, experience	2	Translation into isiXhosa
Culture image and examples	2	Pictograms tested in target population
Total SAM score	32	
Total possible score	36	Percent score = 88.90%

5.3 Qualitative evaluation of the PIL

Table 5.2 shows the comments and recommendations from the three groups interviewed. The patients were all happy with the information in the leaflet and did not offer any recommendations for improvement. The landscape PIL with side effect pictograms was generally regarded as the preferred choice.

Table 5.2: Changes to the PIL following group interviews

Group	Regimen 1a PIL	Modifications
1) Participants	A plastic bag was used to represent supermarket 'CD4 cell count' was initially used	Substitute with a banner containing the names of well known South African chains of supermarkets 'Cd4 count' to be used
2) Healthcare providers	'Take your medicine after food and with a full glass of water' 'in the first 6 weeks...' 'after 2-3 months...'	'If possible take your medicines after food and with a full glass of water' 'you must continue taking all three of your medicines' was added 'in the first 2 weeks...' 'after 3- 6 months ...' Remove CD4 count pictogram Add section about nutrition
3) Patients		No modifications recommended

The HCPs suggested that a statement about good nutrition should be included in the leaflet. While good nutrition is important to maintain optimal health, it is part of general counselling rather than ART-related counselling which was the focus of this PIL therefore information about good nutrition was excluded. They also recommended that the CD4 count pictogram should be removed because not all patients initiated on ARVs present in an emaciated state, whereas in other patients the CD4 count does not stabilise rapidly. They felt that this might either confuse or create false hope in patients. The dietician commented that because no nutrition statements had been added, this pictogram was inaccurate. The design team decided to retain this pictogram because responses from both the participants and more particularly, the patients, confirmed that it was understood and correctly interpreted. As one of the patients said, 'The image shows that when ARVs are taken the person becomes healthy'.

These group interviews proved invaluable in modifying and refining the PILs, resulting in the final versions of the four PILs used in the quantitative evaluation for this study.

5.4 Quantitative evaluation of the PII

5.4.1 Demographic characteristics

Table 5.3: Demographic characteristics

Demographic parameter	Participants N (%)			p-value
	Total N = 80	Control N = 39	Experimental N = 41	
Gender				
Male	28 (35.0)	13 (31.7)	15 (38.5)	0.52
Female	52 (65.0)	28 (68.3)	24 (61.5)	
Age				
18 – 29	15 (18.7)	12 (30.8)	3 (7.3)	0.00
30 – 39	18 (22.6)	12 (30.8)	6 (14.7)	
40 – 49	32 (40.0)	11 (28.2)	21 (51.2)	
≥ 50	15 (18.7)	4 (10.2)	11 (26.8)	
Education				
≤ Grade 3	19 (23.7)	5 (12.8)	14 (34.1)	0.07
Grades 4 – 7	27 (33.8)	14 (35.9)	13 (31.7)	
Grades 8 – 10	34 (42.5)	20 (51.3)	14 (34.1)	
Employed				
Yes	3 (3.8)	2 (5.1)	1 (2.4)	0.52
No	77 (96.2)	37 (94.9)	40 (97.6)	
Clock face				
Yes	73 (91.2)	33 (84.6)	40 (97.6)	0.04
No	7 (8.8)	6 (15.4)	1 (2.4)	

The demographic characteristics of the participants are presented in Table 5.3 All 80 people approached agreed to participate. The study sample was predominantly female with only 28 (35.0%) male participants. Thirty-two (40.0%) participants were in the age range of 40–49 years, 18 participants (22.6%) were in the age group 30 – 39 years, the remainder were equally divided between age groups 18 – 29 years and 50 years and above with 15 participants (18.7%) in each group. Thirty-two (78%) of the participants in the Experiment group were aged 40 years and above while only 15 (38.4%) participants in the Control group were in the same age range.

Of the 80 participants, 46 (57.5%) had less than eight years of formal education, ensuring a good representation of a population with significantly compromised reading skills. It was difficult to find participants with no formal schooling as the study was

conducted in a town where access to schooling is easier than in the more rural areas. In the Experimental group, 13 (31.7%) participants had between grades 4-7 and the remaining 28 participants were equally divided between the other two groups. Just over half of the participants in the Control group had between grades 8-10 and only 5 (12.8%) participants had an education level less than the third grade. Overall, seven (8.8%) participants indicated that they could not tell the time either from a clock face or a digital face, with 6 (15.4%) being in the Control group. Approximately 95% of participants in both groups were unemployed. There was no significant difference observed for gender, education and employment. Although no significant difference in education was established between the groups, the most dramatic difference occurred in the lowest education group where the implications are the most dramatic. For age (p-value= 0.00) and telling time from a clock face (p-value=0.041) there was an observed significant difference.

5.4.2 Literacy test

Results for the literacy test (Appendix B) show that Questions 3, 4 and 7 were the most poorly answered with all of them addressing information that did not constitute routine medicine-taking instructions (Table 5.4).

Basic health numeracy is the ability of patients to understand, interpret and act on numbers without manipulation. With this type of numeracy skill, the patient should be able to identify the number of pills to consume, the dosing schedule and appointment dates [191]. The most common response to the question 'If you take this medicine at 12:30 pm when can you start eating your lunch?' was 1 pm (13:00). It was apparent that most people in the study did not fully comprehend the information on the label about a time lapse between eating and taking the medicine and therefore made no attempt to do any calculations. People seemed to choose this time as it is the start of the normal 13:00 to 14:00 lunch hour.

Table 5.4: Correct response results of the literacy test

Questions	Participants N (%)		
	Total N = 80	Control N = 39	Experimental N = 41
1 How many teaspoons must you take when you start this medicine?	70 (87.5)	34 (87.2)	36 (87.8)
2 How many teaspoons must you take each time thereafter?.	48 (60.0)	26 (66.7)	22 (53.7)
3 If you take this medicine at 12:30 pm when can you start eating your lunch?	8 (10.0)	4 (10.3)	4 (9.8)
4 Does the label say that you can't drink milk or water when taking this medicine?	35 (43.8)	19 (48.7)	16 (39.0)
5 Will you keep any medicine to use next time you get sick?	58 (72.5)	28 (71.8)	30 (73.2)
6 How often must you take this medicine?	45 (56.2)	20 (51.3)	25 (61.0)
7 What can this medicine do to your teeth?	34 (42.5)	18 (46.2)	16 (39.0)
8 How should this medicine be stored?	62 (77.5)	31 (79.5)	31 (75.6)

Another commonly offered answer was that a person should eat at 1 pm or 2 pm and, this can possibly be attributed to the fact that in the medicine label text it was stated 'Take two medicine measures immediately and then one medicine measure one hour before meals or two hours after meals'. The participants could have associated the one in 'one hour' and the two in 'two hours' as the actual time required to have meals. It may therefore be assumed that this target population lacks basic health numeracy and may encounter difficulty in fully understanding comprehensive medicine-taking instructions.

For question 4 the term 'milk' was used whereas the medicine label used the term 'dairy products' which could have confused the participants. The collective term 'dairy products' is rarely used in this ethnic group, as these products are generally referred to by their individual names, for example, milk, cheese and yoghurt.

Table 5.5: Overall correct understanding of the literacy test

% Understanding score	Participants N (%)		
	Total N = 80	Control N = 39	Experimental N = 41
<60%	33 (41.2)	19 (48.7)	18 (43.9)
60 – 80%	30 (37.5)	11 (28.2)	18 (43.9)
> 80%	17 (21.3)	9 (23.1)	5 (12.2)

Only 17 from the total of 80 participants scored more than an acceptable 80% in this test (Table 5.5). The literacy test was in English and this could have influenced the results. There is a possibility that if the participants were offered the isiXhosa translation they may have achieved better results.

5.4.3 Understanding of the PIL

The majority of the participants, 74 (92.5%), chose to read the isiXhosa version of the PIL; the average time taken to read the leaflet was 6 minutes 57 seconds. Thirty-two (40.0%) participants took less than 5 minutes to read the leaflet and only two participants took ten minutes to read the leaflet.

No significant differences were found between the Control and Experimental group for the understanding and correct responses to 19 of the 20 questions asked. Only one question (Question 10) resulted in a significantly better response which was from the Experimental group ($p=0.02$).

Questions 1, 3, 9 and 16 focused on basic drug information such as drug names and medicine-taking instructions. Sixty-three (78.8%) participants correctly understood Question 3 whereas Question 9 was correctly understood by 75 (93.8%) participants and achieved the EC target. These medicine-taking instructions were illustrated with a picture demonstrating both the number of tablets or capsules per dose and when they should be taken. The frequency of dosing and the time at which to take efavirenz was not as well answered as the number of lamivudine tablets to be taken. A twice daily medicine regimen may be more familiar to this population than taking medicines at night only.

When the participants were asked to show the interviewer the names of the medicines in the PIL (Question 1), less than two thirds (65.0%) were able to correctly locate and name the medicine. However, study participants were not familiar with the names of the ARVs and it is probable that patients taking ARVs would be much more successful in locating and naming the medicines in the PIL as it would be directly relevant to their own health and medicine-taking behaviour.

Almost two thirds of the participants (66.2%) were able to describe what to do when missing a dose of ARVs (Question 16) The answer to this question was situated in the 'While taking your ARVs' section but may have been easily overlooked or difficult to locate because it was not prominently large and was 'sandwiched' by surrounding pictograms and text.

There were seven questions relating to the 'Side effect' section (Questions 5, 7, 11, 13, 15, 18 and 19). No significant differences were found between the Control and the Experimental groups in understanding and correct responses to any of these seven questions dealing with side effect information. Both Questions 5 (92.5%) and 13 (82.5%) were well answered and exceeded the EC target. Question 5, which required participants to describe some of the side effects was much better answered by the Experimental group, with the pictograms possibly enhancing location of this information. Successful location of the information for Question 13 could be attributed to the fact that the sub-heading 'In the first two weeks after starting ARVS' was printed in bold.

Questions 7 (20.0%) and 18 (16.2%) were particularly poorly answered, with the answer to both questions appearing in the same sentence. Even though bullet points were used in the section containing this statement, it was a longer sentence in comparison to others in the PIL. These points should have appeared as two separate, shorter sentences. Another poorly answered question was Question 11 (40.0%) for the same reason as Question 7 and 18. None of the answers to these questions were emphasised in the text, which could have made it difficult for the participants to locate the information.

Table 5.6: Understanding of individual questions asked about information in the PIL

Questions	Answer	Participants			p-value
		Total N=80	Control N = 39	Experimental N = 41	
1 Can you show me the names of the medicines in the leaflet?	Located	52 (65.0)	26 (66.7)	26 (63.4)	0.76
	Understood	52 (65.0)	26 (66.7)	26 (63.4)	0.76
2 Can a person spread AIDS to other people while taking ARVs?	Located	39 (48.8)	22 (56.4)	17 (41.5)	0.18
	Understood	33 (41.2)	18 (46.2)	15 (36.6)	0.38
3 How many times a day must a person take efavirenz, according to the leaflet?	Located	63 (78.8)	30 (76.9)	33 (80.5)	0.69
	Understood	63 (78.8)	30 (76.9)	33 (80.5)	0.69
4 Will the HIV go away for good when a person takes ARVs?	Located	45 (56.2)	18 (46.2)	27 (65.9)	0.07
	Understood	45 (56.2)	18 (46.2)	27 (65.9)	0.07
5 Like other medicines, these medicines have both good and bad effects. Does the leaflet tell you what some of these side effects are?	Located	74 (92.5)	34 (87.2)	40 (97.6)	0.07
	Understood	74 (92.5)	34 (87.2)	40 (97.6)	0.07
6 What do these medicines do to the amount of virus (viral load) in the body?	Located	27 (33.8)	12 (30.8)	15 (36.6)	0.58
	Understood	25 (31.2)	12 (30.8)	13 (31.7)	0.92
7 Will someone taking ARVs usually experience ALL these side effects?	Located	18 (22.5)	8 (20.5)	10 (24.4)	0.67
	Understood	16 (20.0)	7 (17.9)	9 (22.0)	0.65
8 Is there anything a person taking ARVs should do before taking these other medicines?	Located	23 (28.8)	14 (35.9)	9 (22.0)	0.16
	Understood	23 (28.8)	14 (35.9)	9 (22.0)	0.16
9 How many of the lamivudine (3TC) tablets should a person take each time?	Located	74 (92.5)	37 (94.9)	37 (90.2)	0.43
	Understood	75 (93.8)	37 (94.9)	38 (92.7)	0.68
10 For how long does a person have to take these medicines?	Located	43 (53.8)	16 (41.0)	27 (65.9)	0.02
	Understood	43 (53.8)	16 (41.0)	27 (65.9)	0.02

Table 5.6 (cont.)

Questions	Answer	Participants			p-value
		Total N=80	Control N = 39	Experimental N = 41	
11 Is there anything a person should do if they experience side effects?	Located	32 (40.0)	17 (43.6)	15 (36.6)	0.52
	Understood	32 (40.0)	17 (43.6)	15 (36.6)	0.52
12 Where should a person keep medicines?	Located	80 (100.0)	39 (100.0)	41(100.0)	0.30
	Understood	79 (98.8)	38 (97.4)	41(100.0)	
13 Give me an example of side effects that will show when a person first starts taking ARVs?	Located	68 (85.0)	34 (87.2)	34 (82.9)	0.59
	Understood	66 (82.5)	34 (87.2)	32 (78.0)	0.28
14 What happens to the good cells (CD4 cells) when a person starts taking the medicine?	Located	36 (45.0)	18 (46.2)	18 (43.9)	0.84
	Understood	34 (42.5)	18 (46.2)	16 (39.0)	0.51
15 Give me an example of the side effects that will happen after a few months of taking ARVs?	Located	43 (53.8)	25 (64.1)	18 (43.9)	0.07
	Understood	43 (53.8)	25 (64.1)	18 (43.9)	0.07
16 What should a person do when they miss a dose of ARVs?	Located	56 (70.0)	27 (66.7)	29 (70.7)	0.88
	Understood	53 (66.2)	26 (66.7)	27 (65.9)	0.93
17 Can your friend or brother who is also HIV positive and has extra ARVs give you some of his when you do not have any ARVs?	Located	72 (90.0)	36 (92.3)	36 (87.8)	0.50
	Understood	72 (90.0)	36 (92.3)	36 (87.8)	0.50
18 Does this list of side effects show ALL the side effects one can experience when taking ARVs or are there others?	Located	13 (16.2)	6 (15.4)	7 (17.1)	0.83
	Understood	13 (16.2)	6 (15.4)	7 (17.1)	0.83
19 Would all side effects happen soon after starting ARVs?	Located	42 (52.5)	22 (56.4)	20 (48.8)	0.49
	Understood	42 (52.5)	22 (56.4)	20 (48.8)	0.49
20 Earlier we asked you where a person should keep medicine. Now, where shouldn't a person keep the medicines?	Located	76 (95.0)	36 (92.3)	40 (97.6)	0.28
	Understood	76 (95.0)	36 (92.3)	40 (97.6)	0.28

Shading: Questions that achieved the 80% correct understanding of the EC target

Questions 15 (53.8%) and 19 (52.5%) were similar in that they both asked about the occurrence and time frame of side effects. The poorer performance of the Experimental PIL (43.9%) versus the Control PIL (64.1%) for Question 15 could have been due to the formatting and layout of the information. In the latter, the information was presented in one solid and distinct column which required the text to be conventionally read from the top to the bottom of the page. However, in the Experimental PIL the information appeared in two columns, which required the participants to read firstly down the left column, then move the gaze upwards and sideways to the next column on the right. Although the columns representing the different time frames were separated by white space, this was apparently insufficient for the participants to distinguish between the two time frames.

The two questions pertaining to storage conditions, namely Question 12 (98.8%) and Question 20 (95.0%) were well understood and answered. However, one person in the Control group was unable to give the correct answer for Question 12, stating that the leaflet showed her that she should store medicines in the refrigerator. This information was illustrated in both PILs with pictograms showing where to store medicines. This finding supports other research showing that a well designed image, used in combination with text, is a highly effective way of communicating concrete instructions [86,89,92,123,125,126,135].

Question 17 (90.0%) was about sharing medicines and was surprisingly well understood as medicine-sharing is a common occurrence in this population. The answer to this question was emphasised with bold type, there was a lot of white space surrounding this statement and a pictogram was used to illustrate this instruction, a combination of tactics which appeared to enhance the ability of this population to locate and understand information.

With the extremely high HIV infection rate in South Africa, HIV/AIDS-related information and education appears frequently in all types of media; posters and pamphlets are commonly seen in all primary health clinics. It could be expected that awareness of the issues concerned with this disease is fairly good. A total of six

questions (Questions 2, 4, 6, 8, 10 and 14) were asked about general information pertaining to HIV/AIDS and to aspects of taking ARVs.

Surprisingly, less than half (48.8%) of the participants could not locate the answer to Question 2 'Can a person spread AIDS to other people while taking ARVs?' and a staggering 41.2% could not give the correct answer. The Control group (46.2%) achieved better results than the Experimental group (36.6%) The result could have been attributed to the fact that the 'Auxiliary' section was the last piece of information placed in a corner right at the end of the Control PIL. Unlike in the Experimental PIL, it was not enclosed and 'hidden' by the borders of the 'Side effect' and 'How to store your ARVs' section, and was therefore possibly easier to identify and locate.

The information necessary for answering Question 4, which asked whether ARVs cured HIV, appeared as the first bullet point in the PIL, but despite this prominent position, just over half (56.2%) of the participants were able to locate the answer. Mwingira [118] also identified poor knowledge of this crucial issue of the ability to still spread HIV even when taking ARVs.

Question 6, 'What do these medicines do to the amount of virus (viral load) in the body?' was extremely poorly answered (31.2%). A similar question investigated by Mwingira generated an equally poor response [118]. The relationship of ARVS and viral load appears to be a challenging concept to understand when reading about it for the first time.

A similarly challenging and related concept deals with the influence of ARVS on CD4 count and was covered in Question 14 which was correctly understood by 42.5% of the participants. The concept of CD4 cell count is probably foreign to these participants who were not taking ARVs therefore would not appreciate the relevance of the number. In the group interview with the HCPs, one of the doctors who had been working in Masonwabe Clinic for over three years mentioned that this is a difficult concept to fully understand even for the patients who have been taking ARVs for a few months.

Another poorly understood question asked about actions to take before taking other medicines when on ARVS (Question 8). The answer was located in the section 'While

taking your ARVs' but the participants instead pointed to the section 'Before taking your ARVs'. The wording in both sections included the phrase 'tell your doctor, nurse or pharmacist...' and this may have confused the participants hence the low result (28.8%).

The success of ARV therapy in managing HIV/AIDS depends on its chronic, continuous use, but only just over a half of the participants (53.8%) were able to locate and understand this information (Question 10). Most of the participants who did not correctly answer this question pointed to the sub-heading 'After 3-6 months of taking ARVs' which was located in the 'Side effect' section, and then stated that the answer was 'between 3-6 months'. An Eastern Cape government report on TB released in 2007 states that there has been an increase in TB patients in the Cacadu District and the defaulter rate has also increased over the years [192]. To ensure that patients adhere to their treatment they have to collect their daily dose from a nearby clinic for the 6 month duration of the therapy [34]. Seeing that the interviews were conducted at one of the local clinics, this result may have been influenced by the fact that some of the participants were taking medicines for TB and when they saw the phrase '3- 6 months' in the text, they equated it to the length of their therapy.

The overall understanding of the PIL was calculated by summing the correct responses for both location and understanding of all 20 questions. The European Commission (EC) guidelines used for PIL acceptability states that out of every 20 participants interviewed, 16 should be able to answer all questions correctly [189,193]. The results from this study show that only six of the 20 questions achieved the EC target.

The overall average understanding was 60.5% with only one participant achieving 100% (Table 5.7). Just under half (47.5%) of the participants achieved a poor total understanding of less than 60%. Only 15 (18.8%) participants achieved an acceptable total understanding of 80% and above.

Table 5.7: Overall understanding of PIL.

% Understanding score	Participants N (%)		
	Total N=80	Control N=39	Experimental N=41
< 60%	38 (47.5)	18 (46.1)	20 (48.8)
60-79%	27 (33.7)	13 (33.3)	14 (34.1)
80-94%	12 (15.0)	6 (15.4)	6 (14.6)
95-99%	2 (2.5)	2 (5.1)	0 (0.0)
100%	1 (1.3)	0 (0.0)	1 (2.4)

No difference in overall understanding was found between the PILs with and without side effect pictograms ($p=0.944$) although, as noted previously, the PIL containing side effect pictograms was overwhelmingly preferred. The Control PIL achieved an overall understanding of 60.4% while the Experimental PIL achieved an overall understanding of 60.6%.

In the Control group, there was a higher number of younger participants aged below 39 years, and more participants who had studied beyond the 8th grade, whereas in the Experimental group there were more elderly participants, most of whom had only achieved a grade 7 and below. Taking this education bias into account, it might have been expected that understanding would be better in the Control group. This could imply that the pictograms in the side effect section of the Experimental PIL played a role in enhancing understanding of the PIL in that section.

5.4.4. Acceptability of the PIL

Sixty-three (78.8%) participants stated that the leaflet was either easy or average to read. Almost a fifth (21.2%) of the participants stated that the leaflet was difficult to read, a rather disconcerting finding given the effort taken to design a simple leaflet understandable to the lower literate patient in South Africa.

For the questions relating to the readability of the PIL, only one participant articulated that the writing was too small. None of the participants felt that the sentences were too long although eight participants (10%) said the sentences were too short. Only two participants felt the space between the lines was inadequate. All 41 participants who

read the Experimental group concurred that there was enough white space between the lines. This finding suggests that pictogram inclusion in the PIL may create more white space therefore creating the impression there are fewer words to read making it less daunting for participants.

Just over two thirds (88.8%) of the participants agreed that the information included in the PIL (Question 5) was sufficient. A small minority of 9 participants (11.2%) disagreed, with eight of these feeling that the PIL contained insufficient information and the one other participant stated that the information contained was excessive. Three of these nine participants had read the isiXhosa PIL with side effect pictograms, and the remaining six received the English PIL with no side effect pictograms. Therefore no single PIL format could be significantly associated with this aspect of PIL acceptability.

Table 5.8: Acceptability of the PIL

Questions	Response	Participants		
		Total N (%)	Control N=39	Experimental N=41
Readability				
1 How easy was it to read the leaflet?	Easy	32 (40.0)	19 (48.7)	13 (31.7)
	Average	31 (38.8)	12 (30.8)	19 (46.3)
	Difficult	17 (21.2)	8 (20.5)	9 (22.0)
2 Is the writing large enough?	Yes	79 (98.8)	39 (100.0)	40 (97.6)
	No	1 (1.2)	0 (0.0)	1 (2.4)
3 What do you think of the length of the sentences?	Too long	0 (0.0)	0 (0.0)	0 (0.0)
	right	72 (90.0)	33 (84.6)	39 (95.1)
	too short	8 (10.0)	6 (15.4)	2 (4.9)
4 Is there enough space between the lines?	Yes	78 (97.5)	37 (94.9)	41 (100.0)
	No	2 (2.5)	2 (5.1)	
Amount of information				
5 If you had just started taking these medicines and this was all the information you were given about them, do you think it would be enough?	Yes	71 (88.8)	34 (87.2)	37 (90.2)
	No	9 (11.2)	5 (12.8)	4 (9.8)
Words in the text				
6 Are there any words in the text that you did not understand?	Yes, a few	24 (30.0)	18 (46.2)	6 (14.6)
	Yes, many	0 (0.0)	0 (0.0)	0 (0.0)
	No	56 (70.0)	21 (53.8)	35 (85.4)
Pictograms				
8 What do you think this picture means?	Correct	44 (55.0)	20 (51.3)	24 (58.5)
	Incorrect	36 (45.0)	19 (48.7)	17 (41.5)
9 Do you like having pictures in the leaflet?	Yes	79 (98.8)	39 (100.0)	40 (97.6)
	No	1 (1.2)		1 (2.4)
10 What do you think about the size of the pictures?	Too big	1 (1.2)	0 (0.0)	1 (2.4)
	Right size	77 (96.2)	37 (94.2)	40 (97.2)
	Too small	2 (2.5)	2 (5.1)	0 (0.0)
11 Do you think the pictures will help you understand and remember the information better?	Yes	80 (100.0)	39 (100.0)	41 (100.0)
	No	0 (0.0)	0 (0.0)	0 (0.0)
12 Were there any pictures you did not understand?	Yes, a few	14 (17.5)	10 (25.6)	4 (9.8)
	Yes, many	0 (0.0)	1 (2.6)	0 (0.0)
	No	66 (82.5)	28 (71.8)	37 (90.2)
Layout preference				
14 Do you prefer the way the leaflets look?	Experimental	73 (91.3)	33 (84.6)	40 (97.6)
	Control	7 (8.7)	6 (15.4)	1 (2.4)
15 Which of these do you prefer?	Portrait	32 (40.0)	20 (51.3)	12 (29.3)
	Landscape	48 (60.0)	19 (48.7)	29 (70.7)

Just under a third (30.0%) of the 80 participants acknowledged there were a few words they did not understand, mostly medical terms such as the drug names and CD4 count. This was similar to results reported in the Mwingira study in which she also tested a PIL containing ARV information in participants not actually taking ARVs [118]. Table 5.9 shows all the words not understood in both the English and the isiXhosa version of the PIL. It was explained to participants that drug names are just like a person's name. Words in the 'Side effect' section which were misunderstood included 'hallucination' and 'nausea'. It was rather surprising to see that some of the isiXhosa words were also regarded as unfamiliar to some participants, which could mean that these participants speak a different isiXhosa dialect.

Table 5.9: Words in the PILs that were not understood

Words	Number of participants (N=80)
English words	
Antiretrovirals	2
ARVs	3
Stavudine	13
Efavirenz	13
Lamivudine	13
CD4 count	3
Nausea	2
Hallucination	1
isiXhosa words	
Eminweni* (fingers)	1
isichaphuchaphu* (nausea)	1
Ubuthathaka* (weakness)	1

When asked which PIL they preferred (Question 14), an overwhelming 91.3% responded that they preferred the Experimental PIL. Participants in the Control group commented that the Experimental PIL was superior as it shows different pictograms for each side effect and this would make it easy for them to understand and know what each word means. Other participants also mentioned that for the 'Side effect' section of the Experimental PIL, they would not have to read each word under the picture but would just look at the pictures to understand what each side effect was and which ones could occur at different times when taking ARVs.

Possible reasons for the rather low positive opinion could be because it was the first PIL out of the eventual four that they were shown and they therefore had no comparator.

This was also near the end of the interview at which time many participants were tired and were keen to finish. Landscape was preferred over the portrait layout by a majority of 60%. An overwhelming 91.3% of the participants preferred the Experimental PIL.

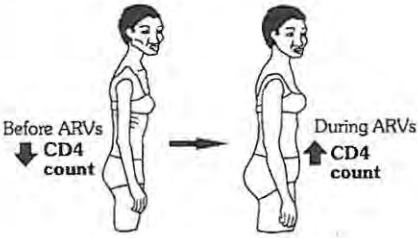
Generally, the pictograms incorporated into the PIL were well understood by the majority of participants (Question 12, Table 5.8). Participants self-reported that they were unable to understand a 'few' images, which included instructions for taking medicines (one participant), spaza and sangoma (two participants each) and CD4 count pictogram (11 participants). A large majority (82.5%) reported understanding all the pictograms in the leaflet and only one participant acknowledged not being able to interpret 'many' pictograms.

When shown the CD4 count pictogram (Question 8, Table 5.8), just over half (55.0%) of the participants were able to correctly identify and explain it. Of the 36 participants who could not interpret the pictogram, 14 were unable to offer any suggestions, stating that they had no idea what the image was showing. Most participants associated an improved CD4 count with getting fat as some of the terms used included 'fat', 'big tummy', 'bigger bum', 'gain weight', 'bigger bottom', 'big boobs'. This could be due to the way the second woman in the pictogram sequence is drawn.

From these responses, it was clear that some participants may have been confusing 'CD4' with 'ARVs' and with 'viral load' as a common response was: 'the first person is sick when they are not taking CD4 counts and the second person is healthy because they are taking CD4 counts'. Other participants suggested that the person's CD4 count is initially high because he/she is not taking ARVs, then once on ARVs the CD4 count becomes low. Other responses to this image are reported in Table 5.10.

It was evident that the participants recognised that there was a physical change occurring in the woman in the picture and that both images showed the same person who experienced these physical changes. The findings further emphasise that there is a need to educate both the public and patients about HIV/AIDS and its treatment including the differences between CD4 count, ARVs and viral load. As mentioned before, the results may improve when this PIL is shown to HIV/AIDS patients who are actually taking ARVs and who would be more familiar with these concepts.

Table 5.10: Misinterpretation of the CD4 count pictogram

Cd4 count image	Misinterpretations
	<ul style="list-style-type: none"> - You have to eat CD4 count - Person was thin before and CD4 count has to be withdrawn from blood - Have to check CD4 count before ARVs then check it again six months later - Person 1 infecting person 2 - Before CD4 is taken person is sick. Then second person has started taking CD4 then she is healthy. - Before CD4 person is sick then CD4 is cured - Shows that person should look after themselves - This pictures you that you must look forward.

Only one of the 80 participants did not approve of having pictures included in the leaflet (Question 9, Table 5.8). This finding is supported by previous research which found that people prefer receiving information containing both text and pictograms over written information only [13,86,118]. Almost all the participants stated that the pictures were the right size, with only two people regarding them as too small. Surprisingly one person felt that they were too large. All 80 participants felt the pictures would improve their understanding of the information in the PIL and help with the recall of this information.

5.4.5 Association between understanding of the PIL and selected variables

A significant association was noted between gender and understanding ($p=0.050$), although the accepted 5% level of significance was only just achieved (Table 5.11). This contradicts previous findings from a study conducted in a similar population [118]. However, further analysis of gender and education revealed that the females were generally more highly educated than their male counterparts, with a higher proportion of females in the 18–29 year age range (27%) compared with only one male (3.6%), as more females had between grade 8–10 (50.0%) than did males (23.5%).

Table 5.11: Association between understanding of the PIL with miscellaneous variables

Variables	Participants (N=80)	Overall % understanding of PILs	
		Mean \pm SD	p-value
Gender			
Male	28 (35.0)	55.4 \pm 18.1	0.050*
Female	52 (65.0)	63.3 \pm 16.3	
Age			
18 – 29	15 (18.8)	61.2 \pm 19.5	0.044*
30 – 39	18 (22.5)	66.3 \pm 21.3	
40 – 50	32 (40.0)	61.9 \pm 13.5	
>50	15 (18.0)	49.8 \pm 13.5	
Education			
\leq Grade 3	19 (23.2)	48.6 \pm 9.5	0.040*
Grade 4 – 7	27 (33.8)	59.7 \pm 16.6	
Grade 8- 10	34 (42.5)	67.8 \pm 17.6	

* Significant influence on understanding ($p < 0.05$)

Both education ($p=0.040$) and age ($p=0.044$) significantly influenced overall understanding of the PIL. It was anticipated that a positive relationship would exist between an increased education level and overall understanding. The study findings supported this prediction with a definite increasing trend in understanding in the three education groups as level of education increased. This supports the findings of Dowse and Ehlers [164] and Mwingira [118].

5.4.6 Association between selected results with gender, age, education and group effect

Selected results were individually analysed to investigate any possible association with gender, age, education and group effect. Group effect refers to the Control and Experimental groups who received different PILs, without and with side effect pictograms, respectively. Table 5.12 shows the significance of these associations.

Table 5.12: Association between selected results and miscellaneous variables

Selected results	Variables			
	Gender	Group ^b	Education	Age
Literacy rating	0.003 ^a	0.544	0.028 ^a	0.228
Time taken to read PIL	0.687	0.046 ^a	0.622	0.591
Number of words not understood	0.354	0.011 ^a	0.032 ^a	0.001 ^a
Number of pictures not understood	0.768	0.033 ^a	0.505	0.042 ^a

^aSignificant influence ($p < 0.05$)

^bControl *versus* Experimental group

Women achieved a significantly higher literacy rating than males, which is similar to the finding for the influence of gender on overall understanding of the PIL. As has been discussed previously, there was a larger number of younger female participants in the study who had higher education levels. There was no significant difference in literacy rating neither for the group effect nor for age.

The only significant association with the time taken to read the PIL was the group effect. A significantly longer time was taken by participants who received the PIL with side effect pictograms. Participants given this PIL had to look at each side effect picture, make sense of it and read the caption below before moving to the next side effect. Furthermore, unlike the bulleted list format used in the Control PIL which is an easily readable format, the information in the Experimental PIL appeared as scattered pictures with the related written information below each image. This resulted in a less logical sequence of information acquisition, which would have a major impact in low-literate readers. It has been shown that low-literate people often miss the underlying understanding and interpretation of information and pictograms due to random eye movement and lack of attention, thus resulting in misunderstanding [12]. This may have possibly resulted in the delay in reading the PIL.

There is a significant correlation between the group effect and number of words understood, with almost half (46.2%) of the participants in the Control group reporting that they did not understand several words in comparison to a significantly lower percentage in the Experimental group (14.6%). This could suggest that the pictograms acted as an aid in promoting the understanding of certain words.

As expected, age and education did influence the number of words not understood. The younger participants and the more educated participants were able to understand the majority of the words in the PIL. A lower educational level and a higher age may have contributed to the lack of understanding of more words.

The number of pictures that were self-reported as not being understood had no significant association with either gender or education. A significant difference was found between the number of self-reported misunderstood pictures with the Control and Experimental groups, and age. Again, this could be due to the increased number of younger and generally more educated participants in the Control group.

5.5 Conclusion

The PIL was understood by a minority of the participants, despite the readability and suitability tests indicating that it would be appropriate for the target population. Further modifications to the PIL are therefore required to try and improve understanding. The literacy test clearly showed that this population lacks health numeracy literacy, which may impede understanding of medicine-taking instructions. A majority of the participants preferred the landscape over the portrait layout and they also preferred the Experimental PIL over the Control PIL. This implies that written leaflets containing visual images are more appealing to people and these materials are more likely to be read. Education influences the understanding of words and overall understanding of the PIL, while age influences the number of understood words, pictures and overall understanding of the PIL. It was also evident that the Experimental PIL took longer to read than the control PIL.

CHAPTER SIX

GENERAL DISCUSSION

6.1 Introduction

There is a need for patients to know more about their health, about any condition that affects them, as well the treatment thereof. This research study aimed to address a gap in the knowledge of South African HIV/AIDS patients about various aspects of their drug therapy.

Research has confirmed that patients desire health information [5,129] with the most common means of delivery of such information in South Africa being verbal information. However, a significant disadvantage of providing only verbal information is that patients usually rapidly forget a large proportion of this information [5,6]. Written medicines information, although able to act as a permanent source of health-related information, demands basic literacy skills. Research reports that literacy, as well as being necessary for personal development, also affects health status [58,59]. Low-literate patients are often linked with poor health and they tend to have higher hospitalisation rates [59,74-77].

Current South African literacy figures indicate that 26% of adults in South Africa are considered to be illiterate [64]. It is estimated that in the Eastern Cape, there is one teacher for every 39 students, the highest teacher/pupil ratio in the country [194]. The study population included individuals from different educational backgrounds ranging from no schooling up to a maximum of 10 years of formal schooling. Only 17 of the 80 participants achieved 80% and above in the basic health literacy test conducted for this research. This could have been influenced by the fact that the literacy test was offered to them in English, as most health-related information is still available mainly in that language. A particular deficiency was noted in basic numeracy skills, which could cause problems in interpreting and adhering to medicine-taking instructions.

Written information has been proven to improve recall and understanding of verbal information [10] and has become widely used as a means of conveying medicines

information, especially when a large volume of information needs to be communicated to patients or when dealing with complicated medicine regimens such as ART. There is minimal written HIV/AIDS-related medicines information available and distributed in sub-Saharan Africa [132], and patients in South Africa attending public sector facilities receive none at all. Given the complexity of ART and the demand for high levels of adherence, it is essential that adequate information about the individual drugs comprising the ARV regimen be understood by patients. This information, if available at all, is usually contained in a complex package insert written at a high readability level and printed on thin, semi-transparent paper in a small font. Each of the three individual ARVs comprising ART has its own package insert, resulting in an enormous amount of information in the three different inserts being presented to patients, a daunting and overwhelming challenge for patients with limited literacy skills to read [9].

This information overload problem is exacerbated by the limited literacy skills of many patients in South Africa. Even in this study, with its simple illustrated PIL containing the bare minimum of text, problems were encountered with some participants feeling that there was too much information for them to read and comprehend.

6.2 Visual images as aids to communicating written information

The universally recognised *Coca-Cola* logo attests to the general assumption that pictures improve communication and convey meaning with little or no use of language [12,86,89,93]. The *Coca-Cola* colours and the iconic ribbon wave are recognised and understood by most people irrespective of country, ethnic group and language. Other images, however, despite widespread use, require an accompanying verbal or written explanation. For example, the skull and crossbones image is used globally but it has different meanings depending on the country, culture, and context in which it is used. This symbol can suggest poisonous hazardous substances, ship pirates, piracy of digital videos and discs or in South African soccer lovers, it could represent one of the most popular football clubs [204,205].

In general, pharmaceutical pictograms have been thought to be universally understood and easy to interpret but research has shown that this is often not the case [89,93,96,102,103]. Very little research appears to have been done in this area of

illustrating the side effects of medicines, and this research project is the first to design, modify and test side effect pictograms for ART. Some of the pictograms depicting commonly encountered side effects can be used for other medicines such as those depicting headache, nausea, dizziness or the pictograms illustrating acceptable and unacceptable storage conditions.

When the intended message is misunderstood, confusion about health related information and medicine-taking instructions occurs, which may have serious consequences. This was the case with one of the pictograms tested in this study for which some of the participants misinterpreted 'take your medicine at night' as 'medicines should be taken at the following times: 3, 6, 9 and 12 o'clock'.

When designing pictograms, it is recommended that they be easily recognisable, grasp the viewer's interest, maintain attention and be comprehensible [96,99]. Pictograms designed for one group may not be suitable for another as has been demonstrated in several studies [12,86,96]. The target population should be included in the process of pictogram design in order to produce culturally acceptable pictograms. In this study, the involvement of the target population in all aspects of pictogram development and testing was invaluable and resulted in pictograms which were understood by the majority of the population and were considered to be helpful in both locating and understanding the written information, which contained culturally familiar acceptable images.

Well-designed pictograms can convey useful information and instructions at a glance and can be helpful in communicating and improving recall of health-related information [103,104]. Low-literate people often miss the underlying message in pictograms, tending to randomly move their gaze across the whole picture without attempting to interpret individual images and integrate them in order to grasp the entire message. They therefore tend to lose attention easily, and either misinterpret the pictogram or do not even attempt to understand it [12,80]. Examples of easily recognised pictograms that were developed and tested in this research included images depicting skin rash and diarrhoea. These were amongst the easiest to develop and were correctly understood by almost all participants, well exceeding the ISO 85% criterion. Their excellent correct interpretation may be attributed to a number of factors: rash and diarrhoea have usually been experienced by most people and are therefore familiar conditions. The images themselves were simply

drawn with all unnecessary detail being excluded which created a pictogram with a clear, main focus that drew the attention of even those with limited visual literacy skills [80,95].

Pictograms have been shown to have a greater capacity for storage in the brain than words [12], they minimize the amount of reading, clarify information and possess a positive effect on recall and memory [11,92,98,99]. Study participants reported that pictograms were a valuable aid in helping them locate information in the leaflet and this was frequently noted by the researcher during the interviews. For example, when required to answer the question about sharing their medicine with friends and family, 90.0% of the participants were able to easily locate and correctly understand the answer. The researcher observed that a majority easily did so by recalling the place of the pictogram and pointing to it without having to reread the leaflet. As medicine-sharing is so common in this population, the excellent understanding of this image makes it a valuable aid in communicating this important information.

Many people in South Africa have low literacy skills but have acquired visual literacy skills and learnt how to decode visual images via the many emblems, logos and symbols used in the country [195]. The pictograms in this study were tailored to incorporate familiar entities, for example spaza shops and a sangoma images respectively, which were well recognised and understood by the participants. Despite the average low education level of some of the participants, they were still able to understand most of the pictograms. This demonstrates that the number of years of formal schooling may not necessarily be a reliable indicator of an individual's ability to understand and interpret pictograms, as acquired life experience and skills may play a significant role in this process [196].

Kitching [5] states that even though colour pictures are attractive, they may be inappropriate for information leaflets. The pictograms used throughout the study were black printed images on white paper, providing a good contrast and making them easy for participants to see. The lines in the images were dark and bold which facilitated visualisation of the smaller versions of the images in the PILs. The majority of the participants stated that the images were large enough and were easily visible.

Abstract signs and symbols and graphic conventions should be used with caution as they may be culturally specific and may need to be learnt in order to be understood [80,87,186]. In general, abstract signs and symbols are poorly understood and interpreted, particularly by low-literate viewers [80,87]. Pictograms illustrating dizziness and nightmares utilised graphic conventions and abstract symbols such as a 'twirl' and the dream bubble. Both these images were among the least understood and created much confusion, confirming the need to make the effort to teach and explain them to low-literate individuals [80,186].

The prohibition cross used, for example in many of the storage pictograms was adopted from a previous study which showed that this type of negation was better understood than a single 'do not' slash [164]. It has been shown that participants easily identify the correct use of the prohibition cross when it is used to indicate unhealthy or forbidden activities [80]. The storage series of pictograms were exceptionally well understood with all five achieving 80% and above correct interpretation. It is possible that the high level of interpretation was enhanced by the fact that these are known to be prohibited places for storing medicines e.g. in a warm area (sun, car, fire) or in a damp and humid area such as the bathroom.

Arrows may be used to demonstrate direction, movement and passage of time, but for low-literate participants this may not be obvious [186], as was found in this study where the arrow was used to illustrate the passage of time in the fat redistribution pictogram series. The arrow was often ignored except in the female version of lipoatrophy image but the reasons for this are unknown. Even when the arrow was noticed, the interpretation of its meaning was often incorrect. In the CD4 count pictogram, the concept of the passage of time which was illustrated using the arrow was vaguely understood, although some participants stated that the picture was of the physical changes occurring in the same woman.

Pictograms may facilitate understanding in people who are not familiar with medical and health-related language and theory [86]. Pictograms may be able to assist low-literate participants in locating associated textual information which was confirmed in this study by the participants who would point at the pictogram when asked to locate an answer for a question. Consumers, regardless of their level of education, appreciate and

prefer to have easy-to-read personalised material than package inserts [12,72,197-199]. The pictograms in the PIL all had captions, which may have simplified their interpretation. They were well received and appreciated by the participants, which supports findings from previous studies that patients prefer information containing pictograms compared to text-only information leaflets [13,86,92,118].

6.3 Designing patient-friendly medicines information leaflets

Pharmacists are an important component of the multidisciplinary healthcare team. They are the last HCP a patient sees before starting his/her course of medicines and are in an ideal position to offer and reinforce any medical and health related information to a patient. One of the pharmacist's roles in patient counselling and influencing medicine-taking behaviour is to motivate patients to take responsibility for their own health [86]. A vital component of this process is the provision of relevant, culturally appropriate verbal and written information at a literacy and educational level suitable for the patient [10,12,86,132].

When designing PILs it is advisable to follow published guidelines, which were valuable in producing the study PIL. The target population was well defined prior to the design of this PIL, making it easy to involve this defined population in the design process and tailoring the PIL to their needs. Evaluation of understanding and content by the end user is vital [12] as it aids in identifying the strengths and the weakness of the PIL in order for it to be improved. In this study the PIL was tested both qualitatively by means of group interviews, and quantitatively through individual interviews whereby participants were required to locate and state the correct answers according to their understanding of the PIL.

Problems associated with most PILs include a small font size, excessive number of pages, inappropriate page size, the use of technical and scientific terms and a layout that does not promote easy navigation through the document [5,11,12,131,134,135]. The PIL was divided into three columns, each of which was bordered with a thick broad line. Columns contained capitalised and highlighted headings, which aided navigation through the various sections. Short sentences and bulleted points facilitated easy reading of information.

The study PIL was printed in a font size which was legible for most participants. Observations from a previous study in a similar target population in Grahamstown demonstrated that the use of capital (upper case) letters in text was ignored [135], thus these letters were strictly used only in headings and where absolutely necessary in the text. Elaborate font styles were avoided except where italics and bold were used to emphasize a point in the text.

The PIL was printed back-to-back when offered to patients. Most of the terms used in the leaflet were simple, commonly used words, which were generally understood by the majority of the participants. Unfortunately, in HIV and AIDS-related information, the use of medical terminology such as the drug names, 'viral load' and 'CD4 count' is unavoidable. As previous research has shown [118,127] these medical terms proved difficult for some participants to understand and their presence interrupted the flow of reading the PIL. Similar to a study conducted by Mansoor [135], the presence of smaller paragraphs, bulleted points, and pictograms allowed for sufficient white space, which resulted in a less daunting and preferred PIL.

Literature suggests that layout and the manner in which the PIL is presented may influence the usability, understanding, and acceptability [72]. This was observed when analysing the results from the questions about the time frame of side effect occurrence. Contrary to expectations the PIL with illustrated side effects achieved a poorer correct response (44%) compared to the PIL with no side effect pictograms (64%). In the 'Side effect' section of the Control PIL, namely with no side effect pictograms, the two time frames were placed one below the other, which possibly allowed for easy navigation downwards, whereas in the PIL with side effect pictograms, the two time frames were placed next to each other, but there was probably insufficient white space to distinguish between the two time frames. When comparing PIL orientation and layout, the landscape orientation was preferred by the majority of participants.

6.4 Understanding of written patient information related to HIV/AIDS

Research has consistently shown that health-related materials are generally written at reading levels significantly higher than the reading comprehension levels of most patients [10,144]. Given the rigorous, user-centred design and development process

employed in this study, and the efforts made to include simple text and make the PIL as readable as possible, the overall average percentage understanding of 60.5% was disappointingly lower than anticipated. This reflects poorly on the reading ability of the local population, many of whom were educated under the apartheid schooling system which discriminated between different population groups. People from the same target population, as in this study, often endured an extremely poor standard of education. A quarter of the study population had a maximum of three years of schooling, categorising them as functionally illiterate but despite this they managed to gain an overall understanding for the PIL of 49%.

There appears to be certain information that is difficult to understand irrespective of educational level, partially accounting for the low average understanding. Participants in this study were not AIDS patients taking ARVs and were therefore not overly familiar with knowledge about transmission of AIDS while on ARVs (49%) and the treatment of disease. Fifty-six percent thought that ARVs cured AIDS. However, it is anticipated that questions dealing with these issues would be much better answered by HIV/AIDS patients who were actually taking ARVs as all patients receive some counselling prior to initiation of therapy. Unfortunately, it does reflect negatively on the usage of written health-related leaflets as a means of educating an uninformed population.

South Africa's current HIV prevalence is estimated to be at 2.7 million and HIV/AIDS-related information and education appears frequently in all types of local media. It was expected that general information about issues concerned with this disease would be easily understood. However the findings identified a significant lack of knowledge of general HIV/AIDS information in this study population and this problem can be extrapolated to the average South African population, indicating that there are still many people who are not aware of the risks of contracting HIV, the appropriate management of HIV/AIDS and the use of ARVs. In the *South African Demographic and Health Survey (SADHS) report, 2003* it was reported that low-literate individuals had a lower knowledge of AIDS than their literate counterparts did [200]. The same report identified the Eastern Cape as one of the three provinces in which a high population of women did not know that HIV transmission can be reduced by the use of condoms, or by sleeping with an uninfected partner or by doing both [200]. This raises a health promotion issue

and demands that better quality, more appropriate education about HIV transmission, management and ARVs should be accessible to patients and to the general public.

The overall understanding for the PILs, with and without side effect pictograms, was very similar. It was anticipated that illustrating the side effects with pictograms would improve understanding of that section, thereby improving overall understanding, but this was not apparent. The presence of pictograms increased the time it took to read the PIL, an observation reported in other studies [118,135]. The layout of the text had to be modified in order to accommodate the extra space taken by the images, and this appeared to adversely affect the answering of at least one question asked about side effects as discussed in Section 5.4.3.

The questions were not asked according to the sequential appearance of information in the leaflet which complicated the location of information, a finding reported by Mansoor in her study [135]. A point raised by the participants was that the questions required them to keep turning the leaflet over in order to read the other side, and because of this they kept on losing the exact place where they had read the information.

Patients have the right to receive health-related information in their first language, but it is excessively costly to make the information available in all 11 official languages. Regulation 10 of the *Medicines and Related Substances Act, Act 101 of 1965* [201] as amended in April 2003, requires that each package of medicine shall be accompanied by a PIL containing the information in at least English and in one other official language. In this study, the PIL was first developed in English and was then translated into isiXhosa with both language versions being available to all participants. Similar to previous studies conducted in a similar target population [118,135] it was evident that the participants appreciated reading the leaflets in their first language and generally prefer to receive health and medicine-related information in their first language.

6.5 Limitations of the study

South Africa is a multiracial country with 11 official languages of which isiXhosa is the third most spoken after English and isiZulu. The PILs were only tested on one ethnic group based in a semi-rural town in the Eastern Cape. Most of the participants were

from low to middle socioeconomic class, which does not necessarily represent the economic status of all ethnic groups in South Africa. It is therefore difficult to extrapolate the results to other ethnic groups and people living in other settings, such as rural and urban towns.

The PILs were tested in participants who apparently were not suffering from HIV/AIDS and who were not taking ARVs at the time of the study. These participants would probably have a lower level of interest in and engagement with the information, and would possibly 'give up' more readily if they found the leaflet difficult to read. It is essential to test these PILs in people taking ARVs in order to get a truer indication of the acceptability, suitability and understanding of the PILs.

The majority of the younger participants (61.6%) received the PIL without side effect pictograms and this may have possibly skewed the results to look as though there is no significant difference between the two PILs. However, despite employing a random recruitment procedure using a randomiser to assign the participants to their respective groups, there were significant differences for both age and education. As these variables impact directly on the skill being utilised in this study to test the material i.e. the ability to read and understand the PIL, future studies should avoid this by adopting a stratification process, ensuring that there are similar numbers in each of the age and education sub-categories in both groups.

CHAPTER SEVEN

CONCLUSION

Pictograms depicting medicine-taking instructions, side effects, storage conditions and other aspects of HIV/AIDS management were designed and incorporated in educational patient information leaflets (PILs). These materials were enthusiastically accepted and positively regarded by patients, participants and healthcare providers. Understanding of the PIL ranged from average to excellent, an acceptable outcome given the poor literacy levels of a large sector of the study population. This project contributed to addressing the paucity of research in the area of health-related information design, as there is an urgent demand for such information, particularly in developing countries with their high burden of both acute and chronic disease, where a large proportion of the population usually has low literacy skills. In South Africa, very few HIV and AIDS-related information leaflets and pamphlets are offered to patients at local clinics and hospital, and none of these have been designed in accordance with good design principles, nor do they contain images that have been specifically developed for the leaflet using and subsequently tested before their inclusion.

Package inserts manufactured by drug companies are complex and tailored to suit legal requirement than to suit the targeted patients. This research emphasizes the need to design and develop simple easy-to-read information for such patients, taking into account the readers' level of education and literacy skills and collaborating with the target population in all stages of the development and testing processes. Both objective and consumer testing during the development process should be employed to assess and confirm the acceptability and usability of PILs in the target population.

The findings of this study indicate a disconcerting deficiency in general knowledge about various aspects of HIV and AIDS in this country, despite TV and radio talk programmes, magazines, pamphlets, newspapers, posters and billboards communicating this information to the public on almost a daily basis. This lack of knowledge impacts negatively on the risk of becoming infected and on every other aspect of managing the disease. Many posters appearing in bus shelters, in newspapers, on clinic walls, and in any other public place often appear visually appealing, but contain sophisticated images

and symbols unlikely to be comprehended by those with poor literacy skills. These should all undergo consumer testing to evaluate comprehension of the content before being displayed in public places.

This project involved innovative research into the design of pictograms illustrating side effects and these were generally well interpreted. The storage pictograms were extremely successful in communicating the relevant information, and the other concepts such as the sharing of medicines and possible places to buy medicines showed a high degree of understanding. The research clearly demonstrated that to produce successful pictograms they must be simple, incorporate only absolutely necessary detail and contain realistic recognisable entities that are familiar and that pertain to the viewer's culture. When abstract entities and concepts in the pictograms cannot be avoided, they should be explained and taught to the patients by the HCP. Collaboration with the target population and an iterative process of continuous evaluation, modification and retesting of the pictograms proved invaluable in the pictogram development.

Good study design is central to generating reliable, high quality data that can be analysed statistically. In this study, the participants were randomly allocated into either the Control or the Experimental group prior to collecting any demographic data. A majority of the younger and more educated participants were allocated to the Control group, the group that performed better in the literacy test. Despite this bias in education favouring the Control group, the understanding of both PILs was almost equivalent. This may have therefore inadvertently 'hidden' a possible better understanding of the Experimental PIL. Future studies that aim to investigate comprehension of written documents in low-literate individuals should have the groups stratified for demographics, age and educational level, thus ensuring no differences between the groups for these key variables and to limit the negative bias.

Healthcare providers expressed uncertainty and serious reservations about including pictograms illustrating side effects in the PIL because of the possibility of frightening patients and deterring them from taking their ARVs. Contrary to this, the study participants who were not actually taking ARVs, expressed their liking of the pictograms in clearly illustrating the possible side effects. This is an aspect that requires further investigation. Side effect occurrences are stated as one among many other

reasons why patients tend to be non-adherent to ARVs and generally, patients do not report the side effects they experience.

The PILs developed for this project should be tested in a randomized controlled trial in HIV/AIDS patients who are taking ARVs to assess understanding and acceptability of the PILs, to specifically assess patient understanding of side effects and their frequency of reporting to a healthcare provider and whether patients want the side effects to be illustrated using pictograms, and to determine their influence on adherence. The Makana District Pharmacist, the Chief Medical Officer at Settlers Hospital and the staff at the Masonwabe HIV/AIDS Clinic are all aware of this potential project and are fully supportive and encouraging.

Doctors and researchers working in a well known HIV and AIDS centre in Cape Town have expressed great interest in using the side effect pictograms in their nurse education programme. This is an application that will be investigated in a future research project. This concept could also be applied to the education of community health workers who play such a vital role in managing HIV/AIDS patients. Future research could address the development of teaching material aimed at educating this group of volunteers who also often have limited literacy skills.

The findings from this research on the development and testing of pictograms and PILs may be used as a guide in designing further information related to ARVs. The PIL for this study can be used as a template for designing future HIV and AIDS-related PILs intended for a similar population. These PILs may also be used to introduce patients newly initiated on ARVs to different aspects of this disease such as side effects and to highlight the information that patients should communicate to the HCPs prior to taking ARVs.

Readers prefer reading PILs in their first language therefore medicine and health related information should be offered to patients in their language of choice. Translation of the PIL to other South African official languages should be implemented and tested in other ethnic populations to explore whether the PIL is understandable, acceptable and useful throughout all the provinces of South Africa.

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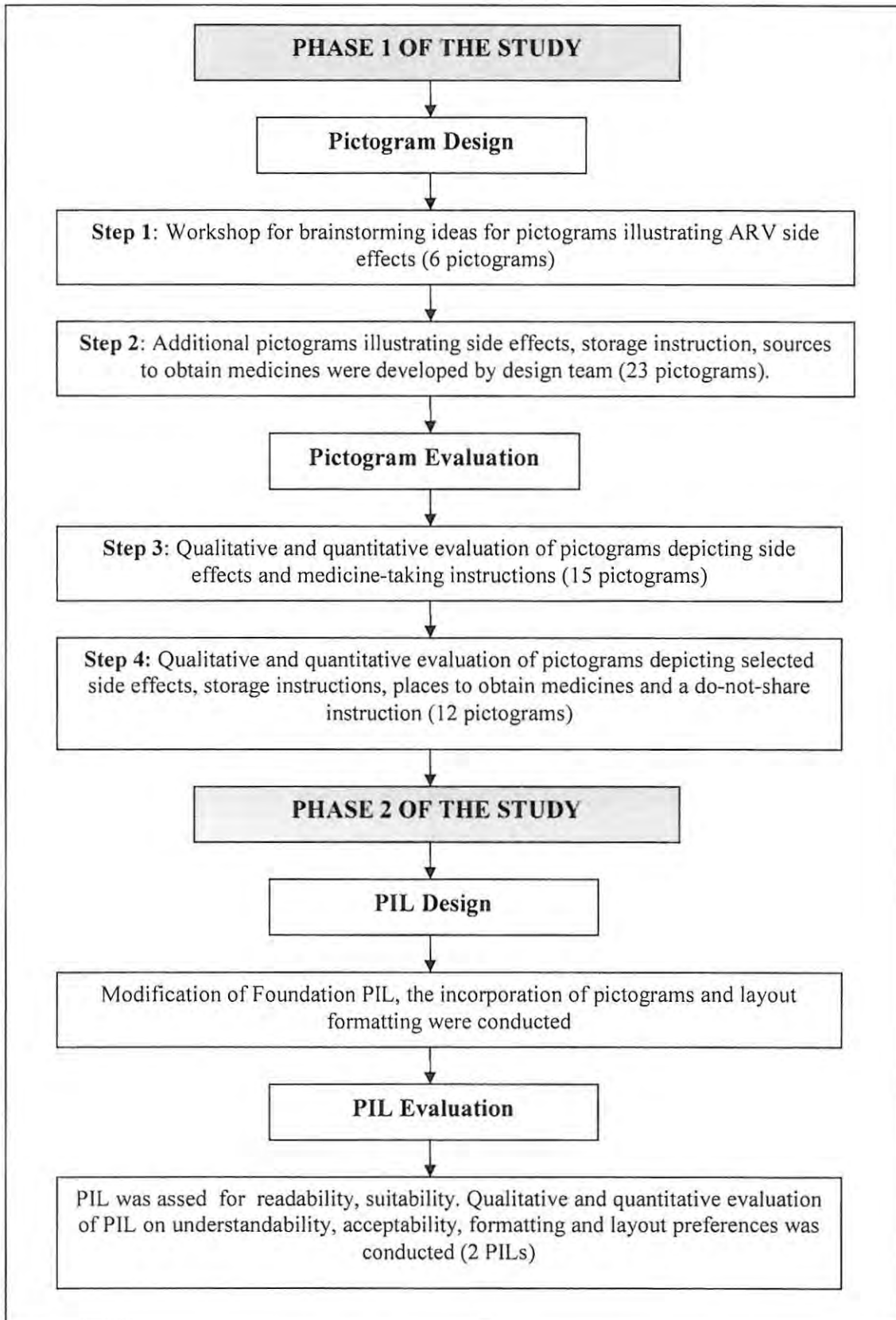
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APPENDIX A

APPENDIX A1

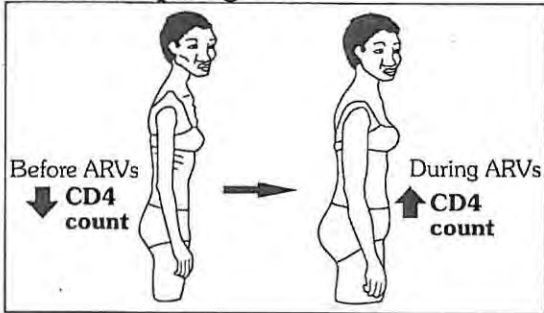
Comprehensive outline of the whole study



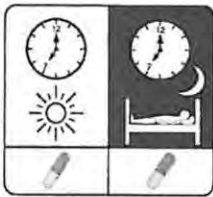
APPENDIX A2

Pictograms incorporated into the PIL

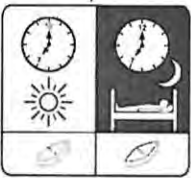
CD4 count pictogram



Take stavudine twice daily



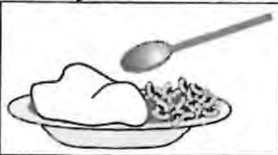
Take lamivudine twice daily



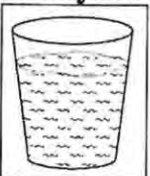
Take efavirenz once daily



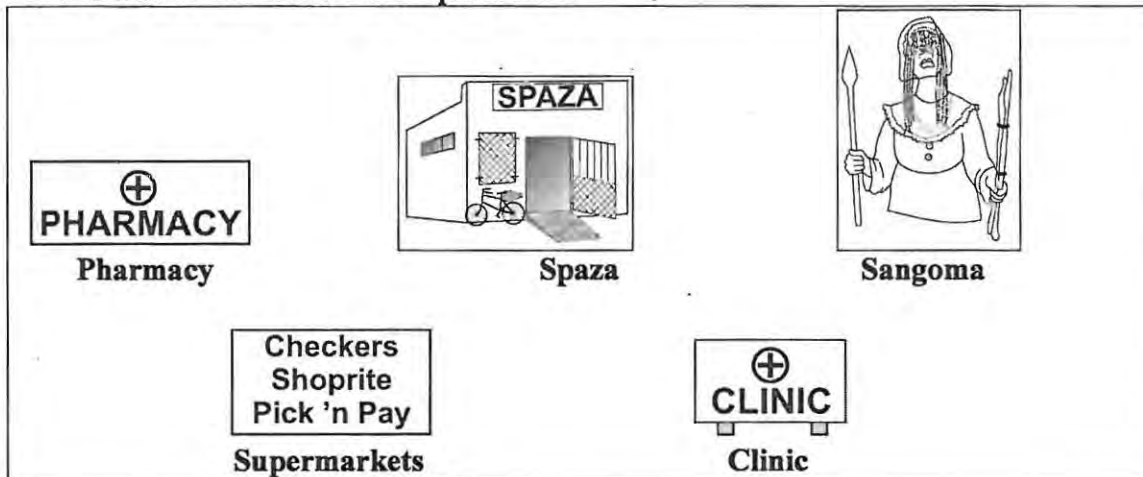
Take your medicines with food



Take your medicines with a full glass of water



Places where medicines can be purchased



Do not share your medicines



Nausea and vomiting



Diarrhoea



Skin rash



Dizziness



Headache



Abdominal pain



Nightmares



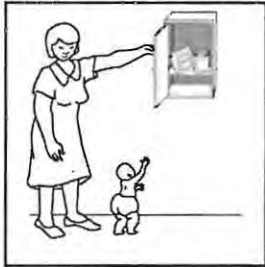
Lactic acidosis



Peripheral neuropathy



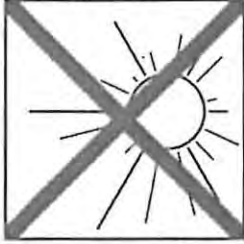
Keep all medicine out reach of children



Keep all medicines in a cool dry place



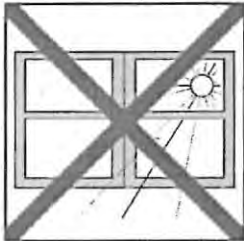
Do not keep medicines in the sunlight



Do not keep medicines in the car



Do not keep medicines on a windowsill



Do not keep medicines next to a fire



Do not keep medicines in the bathroom



APPENDIX B

Literacy test medicine label .

Literacy Test: Cotet suspension medicine label

Cotet Suspension 100 ml

125mg/5ml

Take two medicine measures immediately and then one medicine measure four times daily one hour before meals or two hours after meals. Avoid dairy products or antacids while on this medication. This medication may lead to tooth discolouration in children. Complete the course. Store in a cool place

Mr N Zono

9 September 2008

APPENDIX C

Patient Information Leaflets: English version

APPENDIX C0

Patient Information Leaflet: Original Foundation PIL

ANTIRETROVIRAL THERAPY

Stavudine, Lamivudine and Efavirenz (S4)

Patient information leaflet

What is in this leaflet?

Please read this leaflet carefully before you start taking your medicines.

This leaflet answers some common questions about your medicines.

It does not take the place of talking to your doctor, pharmacist or nurse.

Keep this leaflet with the medicines. You may need to read it again.

What your medicines are used for

These medicines will help you feel better and help you live a longer, healthier life if you take them correctly.

These medicines do not cure HIV/AIDS.

They work by slowing down the production of HIV. They stop the damage HIV does to the body's immune system, which fights infection.

They increase your 'CD4 count' (these are good cells that protect the body against infection).

They reduce your 'viral load' (the amount of HIV in the body, a high viral load is bad)

You can still spread HIV/AIDS by having unprotected sex (not using a condom during sex).

These medicines do not reduce the risk of passing on HIV infection to others. You should continue to take all the proper precautions.

While taking these medicines, you may continue to develop other infections.

You should keep in regular contact with your doctor.

Before you take your medicines

You must tell your doctor, pharmacist or nurse if:

- you are taking or have taken any other medicines
- you have anything else that is wrong with you
- you are allergic to any medicine, food or preservative
- you are pregnant, or trying to fall pregnant
- you are breastfeeding or are on an oral or injectable contraceptive.

Taking other medicines

You must not take any other medicines, natural products or herbal and traditional remedies without first telling your doctor, pharmacist or nurse.

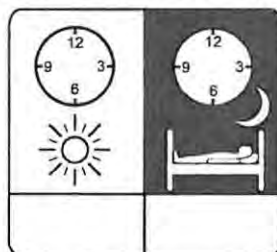
This includes any medicine you buy from the pharmacy, health food shop or supermarket.

How to take your medicines

You must take your medicines as your doctor, pharmacist or nurse instructs you.

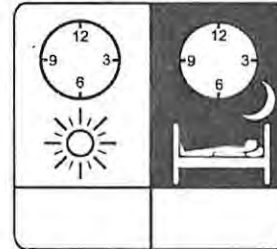
How much to take

1. Stavudine (d4T) (dark orange capsules)



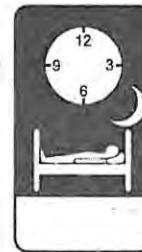
Take 1 capsule in the morning and 1 capsule at night

2. Lamivudine (3TC) (white tablets)



Take 1 tablet in the morning and 1 tablet at night

3. Efavirenz (EFV) (gold capsules)

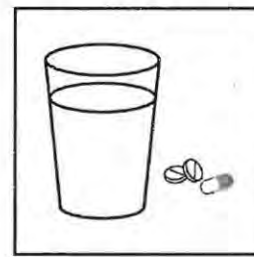


Take 3 capsules at night.

When to take them

You should take your medicines at the same time every day.

How to take them



You must take your medicines with a full glass of clean water.

How long to take them

You must take these medicines every day, for the rest of your life.

Do not stop taking your medicines even if you feel better.

If you forget to take them

Take them as soon as you remember. If you only remember just before your next dose, leave it out and continue as normal.

Never take two doses at the same time.

If you take too much (overdose)

Immediately consult your doctor, pharmacist or nurse. If they are not available, contact the nearest hospital or clinic or poison control centre.

While taking these medicines

Things you must not do

Do not share your medicines with anyone even if they have HIV/AIDS and feel as sick as you do.



You should not drink any alcohol at any time when taking these medicines.

Alcohol will increase the bad effects from these medicines.

Things you must do

Tell your doctor, pharmacist or nurse if, for any reason, you have not taken your medicines exactly as instructed.

If you do not tell them this

- your doctor may think that the medicines are not effective
- you may develop resistance to them.

Possible side-effects

Check with your doctor as soon as possible if you have any problems while taking your medicines, even if you do not think the problems are connected with the medicines, or are not listed in this leaflet.

These side-effects have been reported

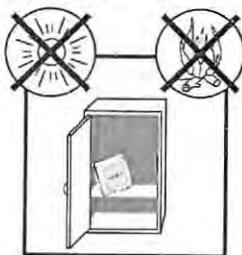
- nausea, vomiting, diarrhoea, indigestion, cough
- tingling, burning, numbness, or pain in the hands or feet
- skin rash, chills with fever
- general ill feeling
- feeling weak, dizzy and tired all the time, weight loss
- trouble in sleeping, hair loss
- headache, confusion
- pain in the chest, stomach back, muscles and joints
- flu-like symptoms.

You may not experience any of these side-effects. If you do experience any of these side-effects and they worry you, see your doctor, pharmacist or nurse.

This is not a complete list of all the side-effects. Others may occur in some people and there may be some side-effects not yet known.

After taking your medicines

Storage



Keep these medicines in a safe, dry and cool place that is away from heat and direct sunlight.

Do not store them in a bathroom or near a sink, or leave them in the car or on a windowsill.



Keep all medicines where children cannot see or reach them.

Disposal

Return all unused medicines to the clinic or to your pharmacist.

Things to remember

- **You must always take your medicines as you are told to.**
- **You must see your doctor regularly for a check up.**
- **Please ask your doctor, pharmacist or nurse if you have any questions.**

Product description

d4T: Active ingredient: 40 mg of Stavudine per capsule. A bottle contains 60 capsules
Registration number: 32/20.2.8/265/6/7

3TC: Active ingredient: 150 mg of Lamivudine per tablet. They are supplied in a white high-density polyethylene bottle, with a plastic cap. Each bottle contains 60 tablets.

Registration number: 30/20.2.8/0366

EFV: Active ingredient: 200 mg of Efavirenz per capsule. A box contains 90 capsules.

Registration number: 0056-0474-92

They are all 'sugar free'

Name and business address of the applicant:

d4T: Bristol-Meyers Squibb, 47 Van Buuren Road, Bedfordview, South Africa. Tel: 011 4656400

3TC: Glaxo Wellcome South Africa (Pty) Ltd, Old Pretoria Road, Midrand, South Africa. Tel: 011 745 6000

EFV: Merck (Pty) Ltd, 1685, Midrand, South Africa. Tel: 011372 5000

Date published: December 2003

APPENDIX C1

Patient Information Leaflet: Landscape PIL without side effects pictograms

ANTIRETROVIRAL THERAPY (ARV)

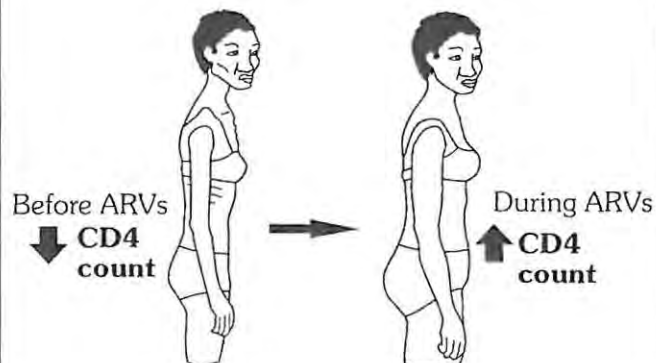
Patient information leaflet for Regimen 1a

The information in this leaflet will help you take your ARVs properly and stay as healthy as possible.

WHAT YOUR ARVs DO

ARVs fight HIV/AIDS :

- they stop the growth of HIV virus (but they cannot kill it)
- they help you become stronger
- they increase the CD4 count (good cells)
- they lower the amount of HIV virus in the blood



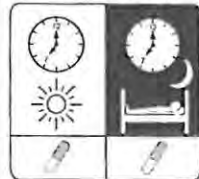
BEFORE TAKING YOUR ARVs

Tell your doctor, nurse or pharmacist if you...

- are taking any other medicines
- have any allergies
- are pregnant or trying to fall pregnant
- are breast-feeding
- are on oral or injectable contraceptive
- have anything else wrong with you.

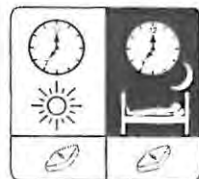
HOW TO TAKE YOUR ARVs

Stavudine (d4T)



Take 1 tablet in the morning and 1 tablet at night.

Lamivudine (3TC)



Take 1 tablet in the morning and 1 tablet at night.

Efavirenz (EFV)



Take 1 tablet at night



If possible...

- take your medicines after food and with a full glass of clean water.
- You must continue taking all 3 of your medicines.

WHILE TAKING YOUR ARVs

Are you taking other medicines?

You must tell your doctor, nurse or pharmacist if you are taking other medicines, herbal remedies or traditional remedies from the:



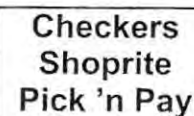
pharmacy



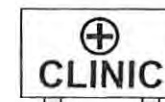
spaza



sangoma



supermarket



clinic

If you forget to take your medicine...

- take it as soon as you remember.

Do not share your medicines...

- with friends or family.



SIDE EFFECTS

- Side effects are unpleasant effects that may appear when taking your medicines, but they can be well managed and treated.
- You may not get these side effects or you may have other side effects that are not listed here.
- If you feel strange or different **in any way** while taking your ARVs, or if you experience any of the following you must tell the clinic sister as soon as possible.

In the first 2 weeks after starting ARVs:

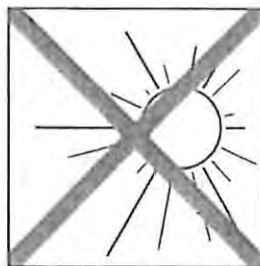
- nausea, vomiting, diarrhoea
- skin rash
- dizziness
- headache
- stomach pain
- abnormal dreams and hallucinations

After 3-6 months of taking ARVs:

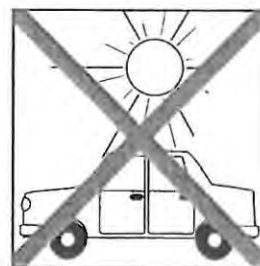
- weakness, stomach pain or vomiting
- tingling, burning, numbness, or pain in the hands or feet (pins and needles)

HOW TO STORE YOUR ARVs

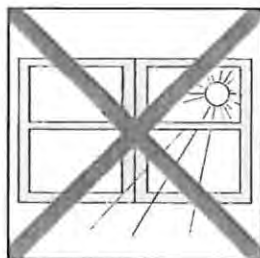
Do not keep your ARVs...



in the sunlight



in the car



on a windowsill



next to a fire

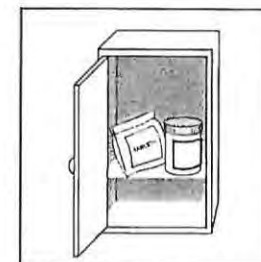


in the bathroom

Keep all medicines...



where children cannot reach them.



in a safe, cool, dry place.

**YOU MUST TAKE ARVs
FOR THE REST OF YOUR LIFE**

**You can still spread HIV/AIDS
by having unprotected sex.**



You must use a condom every time you have sex to protect yourself and others.



RHODES UNIVERSITY

Faculty of Pharmacy, Rhodes University,
Grahamstown 6139.
Tel: 046 603 8381, August 2008



UNIVERSITY OF CAMBRIDGE
SCHOOL OF MEDICINE

APPENDIX C2

Patient Information Leaflet: Landscape PIL with side effect pictograms

ANTIRETROVIRAL THERAPY (ARV)

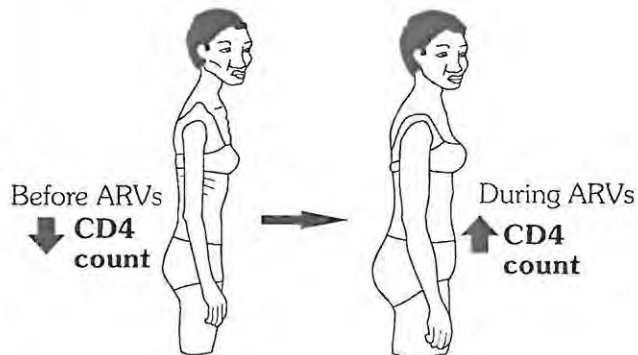
Patient information leaflet for Regimen 1a

The information in this leaflet will help you take your ARVs properly and stay as healthy as possible.

WHAT YOUR ARVs DO

ARVs fight HIV/AIDS :

- they stop the growth of HIV virus (but they cannot kill it)
- they help you become stronger
- they increase the CD4 count (good cells)
- they lower the amount of HIV virus in the blood



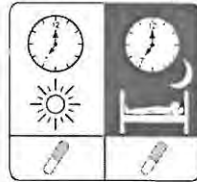
BEFORE TAKING YOUR ARVs

Tell your doctor, nurse or pharmacist if you...

- are taking any other medicines
- have any allergies
- are pregnant or trying to fall pregnant
- are breast-feeding
- are on oral or injectable contraceptive
- have anything else wrong with you.

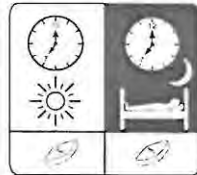
HOW TO TAKE YOUR ARVs

Stavudine (d4T)



Take 1 tablet in the morning and 1 tablet at night.

Lamivudine (3TC)

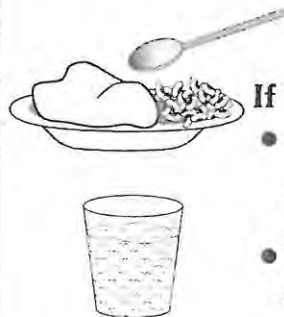


Take 1 tablet in the morning and 1 tablet at night.

Efavirenz (EFV)



Take 1 tablet at night



If possible...

- take your medicines after food and with a full glass of clean water.
- You must continue taking all 3 of your medicines.

WHILE TAKING YOUR ARVs

Are you taking other medicines?

You must tell your doctor, nurse or pharmacist if you are taking other medicines, herbal remedies or traditional remedies from the:



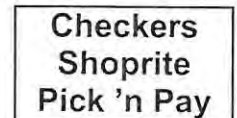
pharmacy



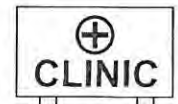
spaza



sangoma



supermarket



clinic

If you forget to take your medicine...

- take it as soon as you remember.

Do not share your medicines...

- with friends or family.



SIDE EFFECTS

- Side effects are unpleasant effects that may appear when taking your medicines, but they can be well managed and treated.
- You may not get these side effects or you may have other side effects that are not listed here.
- If you feel strange or different **in any way** while taking your ARVs, or if you experience any of the following you must tell the clinic sister as soon as possible.

In the first 2 weeks after starting ARVs:

Nausea and vomiting



Diarrhoea



Skin rash



Dizziness



Headache



Stomach pain



Abnormal dreams or hallucinations

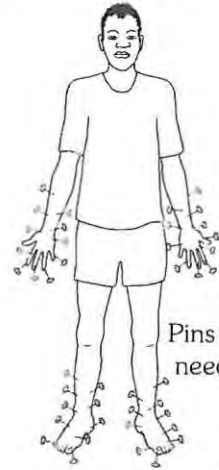


After 3-6 months of taking ARVs:

Weakness, stomach pain and vomiting



Pins and needles



YOU MUST TAKE ARVs FOR THE REST OF YOUR LIFE

You can still spread HIV/AIDS by having unprotected sex.



You must use a condom every time you have sex to protect yourself and others.



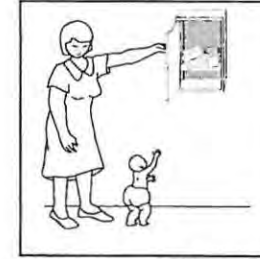
RHODES UNIVERSITY
Faculty of Pharmacy, Rhodes University,
Grahamstown 6139.
Tel: 048 603 381, August 2008



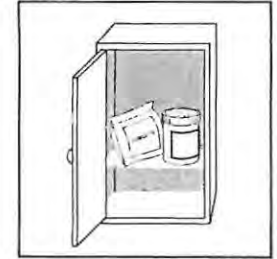
DRUGS OF CHOICE: A SANITARY
INTEGRATED

HOW TO STORE YOUR ARVs

Keep all medicines...

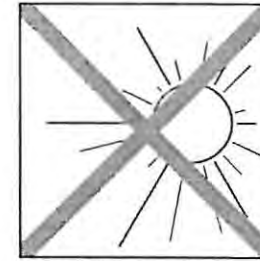


where children cannot reach them.

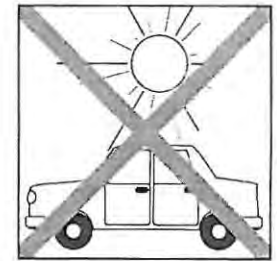


in a safe, cool, dry place.

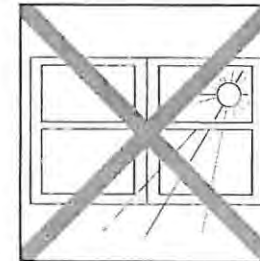
Do not keep your ARVs...



in the sunlight



in the car



on a windowsill



next to a fire



in the bathroom

APPENDIX C3

Patient Information Leaflet: Portrait PIL without side effect pictograms

ANTIRETROVIRAL THERAPY (ARV)

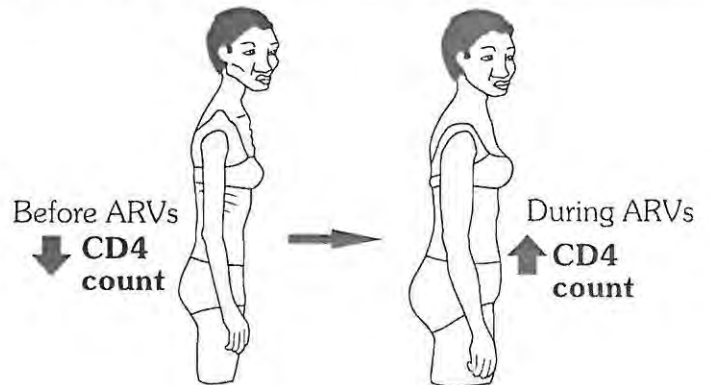
Patient information leaflet for Regimen 1a

The information in this leaflet will help you take your ARVs properly and stay as healthy as possible.

WHAT YOUR ARVs DO

ARVs fight HIV/AIDS :

- they stop the growth of HIV virus (but they cannot kill it)
- they help you become stronger
- they increase the CD4 count (good cells)
- they lower the amount of HIV virus in the blood



BEFORE TAKING YOUR ARVs

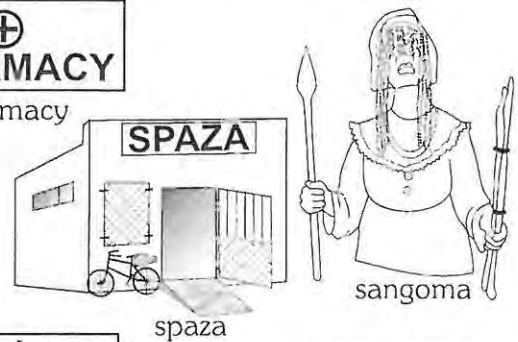
Tell your doctor, nurse or pharmacist if you...

- are taking any other medicines
- have any allergies
- are pregnant or trying to fall pregnant
- are breast-feeding
- are on oral or injectable contraceptive
- have anything else wrong with you.

WHILE TAKING YOUR ARVs

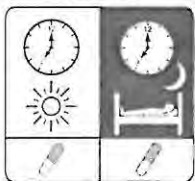
Are you taking other medicines?

You must tell your doctor, nurse or pharmacist if you are taking other medicines, herbal remedies or traditional remedies from the:



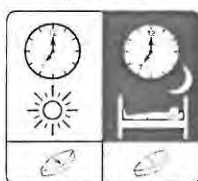
HOW TO TAKE YOUR ARVs

Stavudine (d4T)



Take 1 tablet in the morning and 1 tablet at night.

Lamivudine (3TC)



Take 1 tablet in the morning and 1 tablet at night.

Efavirenz (EFV)



Take 1 tablet at night



If possible...

- take your medicines after food and with a full glass of clean water.
- You must continue taking all 3 of your medicines.

If you forget to take your medicine...

- take it as soon as you remember.

Do not share your medicines...

- with friends or family.



SIDE EFFECTS

- Side effects are unpleasant effects that may appear when taking your medicines, but they can be well managed and treated.
- You may not get these side effects or you may have other side effects that are not listed here.
- If you feel strange or different **in any way** while taking your ARVs, or if you experience any of the following you must tell the clinic sister as soon as possible.

In the first 2 weeks after starting ARVs:

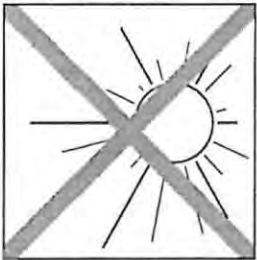
- nausea, vomiting, diarrhoea
- skin rash
- dizziness
- headache
- stomach pain
- abnormal dreams and hallucinations

After 3-6 months of taking ARVs:

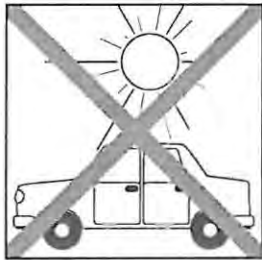
- weakness, stomach pain or vomiting in bigger people
- tingling, burning, numbness, or pain in the hands or feet (pins and needles)

HOW TO STORE YOUR ARVs

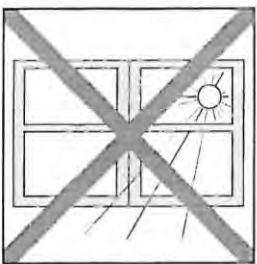
Do not keep your ARVs...



in the sunlight



in the car



on a windowsill

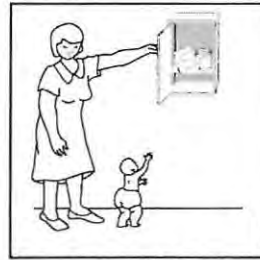


next to a fire

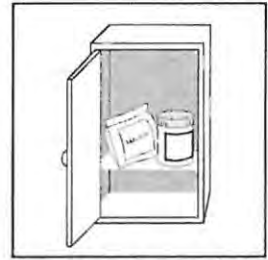


in the bathroom

Keep all medicines...



where children cannot reach them.



in a safe, cool, dry place.

**YOU MUST TAKE ARVs
FOR THE REST OF YOUR LIFE**

**You can still spread HIV/AIDS
by having unprotected sex.**



You must use a condom every time you have sex to protect yourself and others.



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Faculty of Pharmacy, Rhodes University
Grahamstown 6109.
Tel: 046 603 8381, August 2008



UNIVERSITY OF CAPE TOWN
SCHOOL OF MEDICINE

APPENDIX C4

Patient Information Leaflet: Portrait PIL with side effect pictograms

ANTIRETROVIRAL THERAPY (ARV)

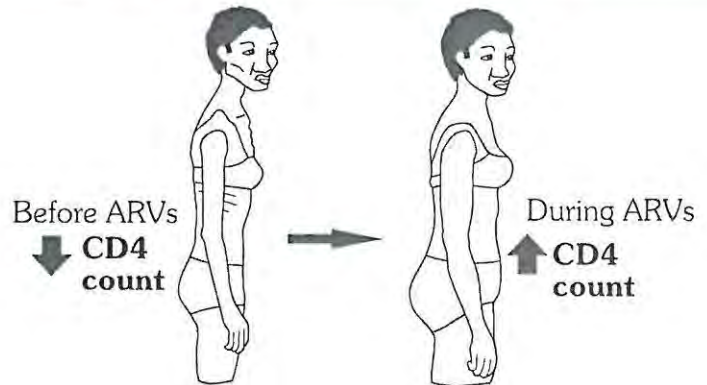
Patient information leaflet for Regimen 1a

The information in this leaflet will help you take your ARVs properly and stay as healthy as possible.

WHAT YOUR ARVs DO

ARVs fight HIV/AIDS :

- they stop the growth of HIV virus (but they cannot kill it)
- they help you become stronger
- they increase the CD4 count (good cells)
- they lower the amount of HIV virus in the blood



BEFORE TAKING YOUR ARVs

Tell your doctor, nurse or pharmacist if you...

- are taking any other medicines
- have any allergies
- are pregnant or trying to fall pregnant
- are breast-feeding
- are on oral or injectable contraceptive
- have anything else wrong with you.

WHILE TAKING YOUR ARVs

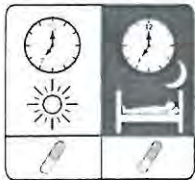
Are you taking other medicines?

You must tell your doctor, nurse or pharmacist if you are taking other medicines, herbal remedies or traditional remedies from the:



HOW TO TAKE YOUR ARVs

Stavudine (d4T)



Take 1 tablet in the morning and 1 tablet at night.

Lamivudine (3TC)



Take 1 tablet in the morning and 1 tablet at night.

Efavirenz (EFV)



Take 1 tablet at night



If possible...

- take your medicines after food and with a full glass of clean water.
- You must continue taking all 3 of your medicines.

If you forget to take your medicine...

- take it as soon as you remember.

Do not share your medicines...

- with friends or family.



SIDE EFFECTS

- Side effects are unpleasant effects that may appear when taking your medicines, but they can be well managed and treated.
- You may not get these side effects or you may have other side effects that are not listed here.
- If you feel strange or different **in any way** while taking your ARVs, or if you experience any of the following you must tell the clinic sister as soon as possible.

In the first 2 weeks after starting ARVs:

Nausea and vomiting



Diarrhoea



Skin rash



Dizziness



Headache



Stomach pain

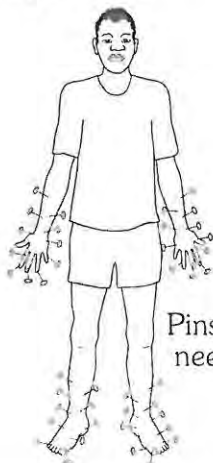


Abnormal dreams or hallucinations

After 3-6 months of taking ARVs:



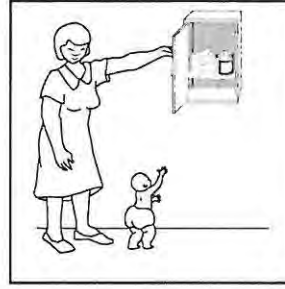
Weakness, stomach pain and vomiting



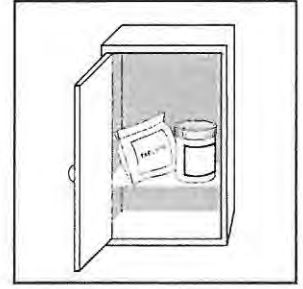
Pins and needles

HOW TO STORE YOUR ARVs

Keep all medicines...

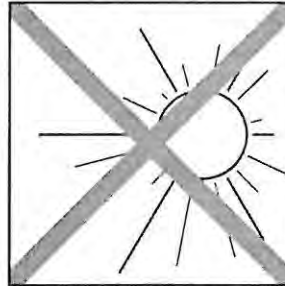


where children cannot reach them.

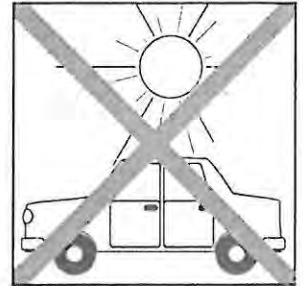


in a safe, cool, dry place.

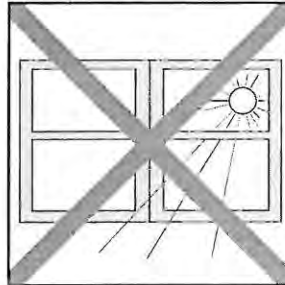
Do not keep your ARVs...



in the sunlight



in the car



on a windowsill



next to a fire



in the bathroom

YOU MUST TAKE ARVs FOR THE REST OF YOUR LIFE

You can still spread HIV/AIDS by having unprotected sex.



You must use a condom every time you have sex to protect yourself and others.



RHODES UNIVERSITY
Faculty of Pharmacy, Rhodes University,
Grahamstown 6139
Tel : 046 603 8381, August 2018



UNIVERSITY OF CAPE TOWN
SCHOOL OF MEDICAL

APPENDIX D

Patient Information Leaflets: isiXhosa version

APPENDIX D1

Patient Information Leaflets: Landscape PIL without side effects pictograms

UNYANGO NGENE-ANTIRETROVIRALS (ARV)

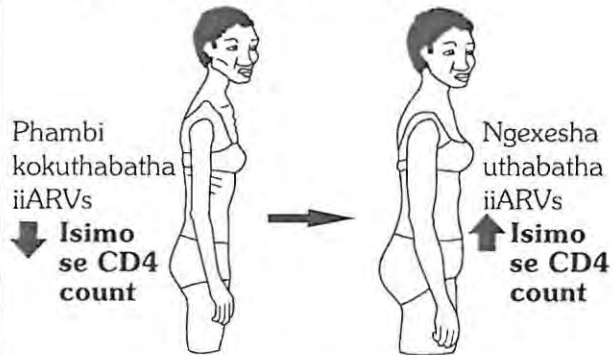
Inkcazelo-sigulane nge Regimen 1a

Lenkcazelo ikweliphetshana ingaluncendo kuwe ngedlela eyiyo yokuthabatha ii-ARVs ukuze uhlale usempilweni ngokukhawuleza.

II-ARV ZISETYENZISELWA NTONI?

Ii-ARV aziyinyangi iHIV/AIDS (ugawulayo nentsholongwane yakhe)

- Zicothisa ukukhula kweHIV
- Ziphelisa umonakalo owenziwa yiHIV kumajoni akho omzimba (zisebenza njengamajoni akhusela umzimba)
- Zinyusa iCD4 count yakho (iiseli ezilungileyo) ze zithobe umthamo wentsholongwane kagawulayo egazini lakho.



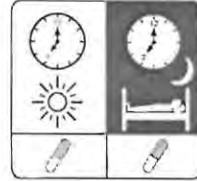
PHAMBI KOKUBA USEBENZISE II-ARV ZAKHO

Xelela ugqirha, usokhemesti okanye unesi ukuba:

- akhona amanye amayeza owathathayo
- kukho enye into engemanga kakuhle empilweni yakho
- kukho amayeza, ukutya okanye naziphi na ezinye izinto ezingavaniyo nomzimba wakho
- ukhulelwe okanye uyazama
- uyancancisa
- uyacwangcisa ngeepilisi okanye ngenaliti.

INDLELA YOKUTHATHA II-ARV ZAKHO

Stavudine (d4T)



Thatha ipilis ibe nye kusasa, nanye futhi ebusuku.

Lamivudine (3TC)

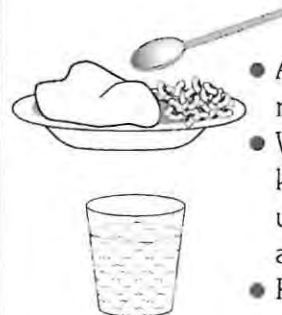


Thatha ipilis ibe nye kusasa, nanye futhi ebusuku.

Efavirenz (EFV)



Thatha ipilis ibe nye ebusuku.



- Amayeza akho wathathe ngexesha elinye yonke imihla
- Wasele amayeza akho emva kokutya makukhona, uwasele neglasi yamanzi acocekileyo
- Kufuneka rhoqo uthathe omathathu amayeza wakho.

NGELI XA USEBENZISA II-ARV

Akhona amanye amayeza owathathayo?
Kufuneka uxelele usokhemesti wakho ukuba usebenzisa amanye amayeza, eminye imixube. Amayeza ezinye owathatha:



ekhemesti



espaza okanye



egqirheni



esuphamakethi



ikliniki

Ukuba uye walibala ukuthatha amayeza akho...

- wathathe nxa uwakhumbula.

Musa ukwabelana ngamayeza akho...

- nabahlobo bakho nefemeli yakho.



IZIPHUMO EBEZINGALINDELEKANGA

- Iziphumo ezingalindelekanga zizinto eziyezivele ngelilixa utya amayeza, kodwa ke ziyalawuleka kwaye ziyanyangeka.
- Usenokungabi nazo ezizinto zichazwe apha okanye uphathwe zezo zingachazwanga apha.
- Ukuba uva into engaqhelekanga ngelilixa utya ii-ARVs okanye uphawula nayiphina kwezizinto zilandelayo xelela u Sister wase clinic kwakamsinyane.

liveki ezi 2 zokuqala emva kokuba usitya ii-ARVs:

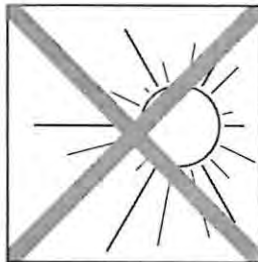
- Isicaphucaphu nokugabha
- Isisu esihambisayo
- Irhashalala
- Iziyezi
- Intloko
- Isisu esilumayo
- Amaphupha amabi

Emva kwenyanga ezi 3 ukuya kwezi 6 usitya ii-ARVs:

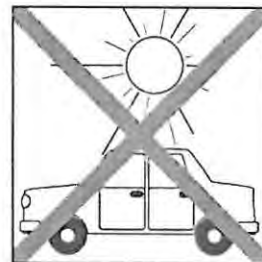
- Ubuthatthatka, ukukhatala, Isisu esilumayo nokughaba
- Inkantsi eminwenni nasezinzwaneni

INDLELA YOKUGCINA II-ARV

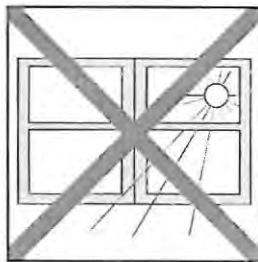
Musa ukuzigcina ii-ARV...



elangeni



emotweni



efestileni

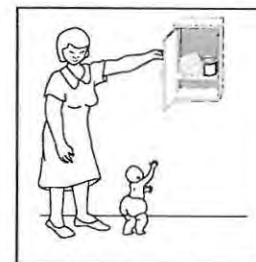


kufutshane nomlilo

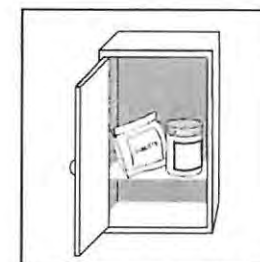


kwigumbi lokuhlambela

Gcina Amayeza akho...



kwindawo
abangenakufikelela
kuyo abantwana.



kwindawo ekhuselekilyo,
epholileyo neyomileyo

Kufuneka uzitye ii-ARVs ubomi bakho bonke

Usenokuyisasaza kwakhona iHIV/AIDS ngokulala neqabane lakho ngaphandle kokuzikhusela.

Kufuneka usebenzise
ikhondom ngalo lonke ixesha
ulala nomntu ukwenzela
ukuzikhusela wena nabanye.



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APPENDIX D2

Patient Information Leaflets: Landscape PIL with side effects pictograms

UNYANGO NGEE-ANTIRETROVIRALS (ARV)

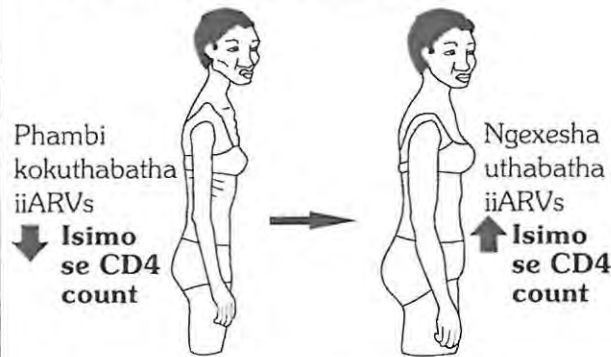
Inkcazelo-sigulane nge Regimen 1a

Lenkcazelo ikweliphetshana ingaluncendo kuwe ngedlela eyiyo yokuthabatha ii-ARVs ukuze uhlale usempilweni ngokukhawuleza.

II-ARV ZISETYENZISELWA NTONI?

Ii-ARV aziyinyangi iHIV/AIDS (ugawulayo nentsholongwane yakhe)

- Zicothisa ukukhula kweHIV
- Ziphelisa umonakalo owenziwa yiHIV kumajoni akho omzimba (zisebenza njengamajoni akhusela umzimba)
- Zinyusa iCD4 count yakho (iiseli ezilungileyo) ze zithobe umthamo wentsholongwane kagawulayo egazini lakho.



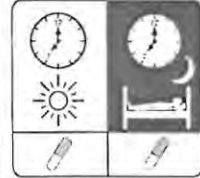
PHAMBI KOKUBA USEBENZISE II-ARV ZAKHO

Xelela ugqirha, usokhemesti okanye unesi ukuba:

- akhona amanye amayeza owathathayo
- kukho enye into engemanga kakuhle empilweni yakho
- kukho amayeza, ukutya okanye naziphi na ezinye izinto ezingavaniyo nomzimba wakho
- ukhulelwe okanye uyazama
- uyancancisa
- uyacwangcisa ngeepilisi okanye ngenaliti.

INDLELA YOKUTHATHA II-ARV ZAKHO

Stavudine (d4T)



Thatha ipilis ibe nye kusasa, nanye futhi ebusuku.

Lamivudine (3TC)



Thatha ipilis ibe nye kusasa, nanye futhi ebusuku.

Efavirenz (EFV)



Thatha ipilis ibe nye ebusuku.



- Amayeza akho wathathe ngexesha elinye yonke imihla
- Wasele amayeza akho emva kokutya makukhoneka, uwasele neglasi yamanzi acocekileyo
- Kufuneka rhoqo uthathe omathathu amayeza wakho.

NGELI XA USEBENZISA II-ARV

Akhona amanye amayeza owathathayo?

Kufuneka uxelele usokhemesti wakho ukuba usebenzisa amanye amayeza, eminye imixube. Amayeza ezinye owathatha:



ekhemesti



espaza okanye



egqirheni



esuphamakethi



ikliniki

Ukuba uye walibala ukuthatha amayeza akho...

- wathathe nxa uwakhumbula.

Musa ukwabelana ngamayeza akho...

- nabahlobo bakho nefemeli yakho.



IZIPHUMO EBEZINGALINDELEKANGA

- Iziphumo ezingalindelekanga zizinto eziyizevele ngelilixa utya amayeza, kodwa ke ziyalawuleka kwaye ziyanyangeka.
- Usenokungabi nazo ezizinto zichazwe apha okanye uphathwe zezo zingachazwanga apha.
- Ukuba uva into engaqhelekanga ngelilixa utya ii-ARVs okanye uphawula nayiphina kwezizinto zilandelayo xelela u Sister wase clinic kwakamsinyane.

Iiveki ezi 2 zokuqala emva kokuba usitya ii-ARVs:

Isicaphucaphu nokugabha



Isisu esihambisayo



Irhashalala



Iziyezi



Intloko



Isisu esilumayo



Amaphupha amabi

Emva kwenyanga ezi 3 ukuya kwezi 6 usitya ii-ARVs:



Ubuthatthatka, ukukhatala, Isisu esilumayo nokugabha



Inkantsi eminwenni nasezinzwaneni

Kufuneka uzitye ii-ARVs ubomi bakho bonke

Usenokuyisasaza kwakhona iHIV/AIDS ngokulala neqabane lakho ngaphandle kokuzikhusela.

Kufuneka usebenzise ikhondom ngalo lonke ixesha ulala nomntu ukwenzela ukuzikhusela wena nabanye.



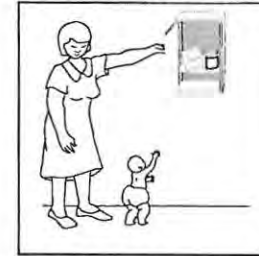
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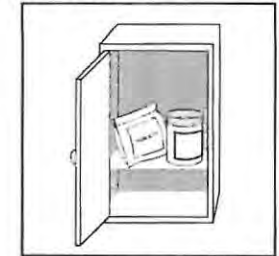
UNAIDS U.S. CALIFORNIA'S SAN DIEGO
ACCEPTS SUPPORT

INDLELA YOKUGCINA II-ARV

Gcina Amayeza akho...

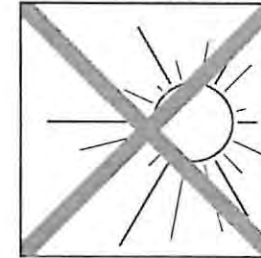


kwindawo abangenakufikelela kuyo abantwana.

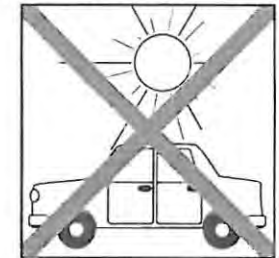


kwindawo ekhuselekilyo, epholileyo neyomileyo

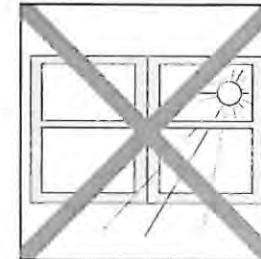
Musa ukuzigcina ii-ARV...



elangeni



emotweni



efestileni



kufutshane nomlilo



kwigumbi lokuhlambela

APPENDIX D3

Patient Information Leaflets: Portrait PIL without side effects pictograms

UNYANGO NGEE-ANTIRETROVIRALS (ARV)

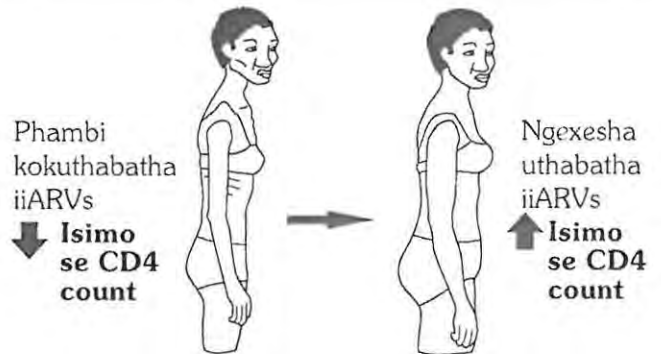
Inkcazelo-sigulane nge Regimen 1a

Lenkcazelo ikweliphetshana ingaluncendo kuwe ngedlela eyiyo yokuthabatha ii-ARVs ukuze uhlale usempilweni ngokukhawuleza.

II-ARV ZISETYENZISELWA NTONI?

Ii-ARV aziyinyangi iHIV/AIDS (ugawulayo nentsholongwane yakhe)

- Zicothisa ukukhula kweHIV
- Ziphelisa umonakalo owenziwa yiHIV kumajoni akho omzimba (zisebenza njengamajoni akhusela umzimba)
- Zinyusa iCD4 count yakho (iiseli ezilungileyo) ze zithobe umthamo wentsholongwane kagawulayo egazini lakho.



PHAMBI KOKUBA USEBENZISE II-ARV ZAKHO

Xelela ugqirha, usokhemesti okanye unesi ukuba:

- akhona amanye amayeza owathathayo
- kukho enye into engemanga kakuhle empilweni yakho
- kukho amayeza, ukutya okanye naziphi na ezinye izinto ezingavaniyo nomzimba wakho
- ukhulelwe okanye uyazama
- uyancancisa
- uyacwangcisa ngeepilisi okanye ngenaliti.

NGELI XA USEBENZISA II-ARV

Akhona amanye amayeza owathathayo?

Kufuneka uxelele usokhemesti wakho ukuba usebenzisa amanye amayeza, eminye imixube. Amayeza ezinye owathatha:



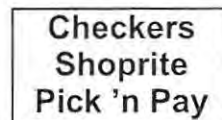
ekhemesti



espaza okanye



eggirheni



esuphamakethi



ikliniki

Ukuba uye walibala ukuthatha amayeza akho...

- wathathe nxa uwakhumbula.

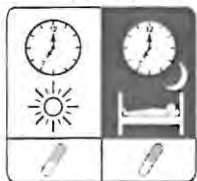
Musa ukwabelana ngamayeza akho...

- nabahlobo bakho nefemeli yakho.



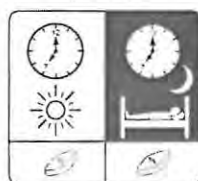
INDLELA YOKUTHATHA II-ARV ZAKHO

Stavudine (d4T)



Thatha ipilis ibe nye kusasa, nenyefuthi ebusuku.

Lamivudine (3TC)



Thatha ipilis ibe nye kusasa, nenyefuthi ebusuku.

Efavirenz (EFV)



Thatha ipilis ibe nye ebusuku.



- Amayeza akho wathathe ngexesha elinye yonke imihla
- Wasele amayeza akho emva kokutya makukhoneka, uwasele neglasi yamanzi acocekileyo
- Kufuneka rhoqo uthathe omathathu amayeza wakho.

IZIPHUMO EBEZINGALINDELEKANGA

- Iziphumo ezingalindelekanga zizinto eziyizevele ngelilixa utya amayeza, kodwa ke ziyalawuleka kwaye ziyanyangeka.
- Usenokungabi nazo ezizinto zichazwe apha okanye uphathwe zezo zingachazwanga apha.
- Ukuba uva into engaqhelekanga ngelilixa utya ii-ARVs okanye uphawula nayiphina kwezizinto zilandelayo xelela u Sister wase clinic kwakamsinyane.

Iiveki ezi 2 zokuqala emva kokuba usitya ii-ARVs:

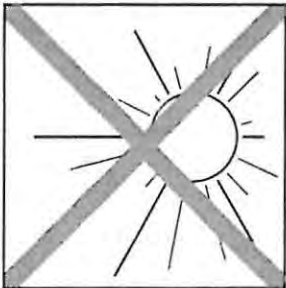
- Isicaphucaphu nokugabha
- Isisu esihambisayo
- Irhashalala
- Iziyezi
- Intloko
- Isisu esilumayo
- Amaphupha amabi

Emva kwenyanga ezi 3 ukuya kwezi 6 usitya ii-ARVs:

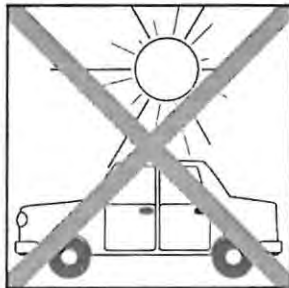
- Ubuthatthatka, ukukhatala, Isisu esilumayo nokughaba
- Inkantsi eminwenni nasezinzwaneni

INDLELA YOKUGCINA II-ARV

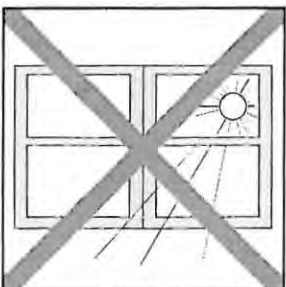
Musa ukuzigcina ii-ARV...



elangeni



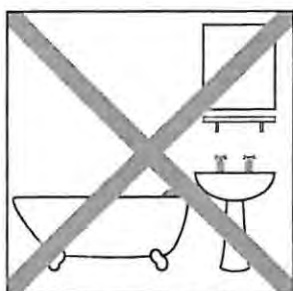
emotweni



efestileni

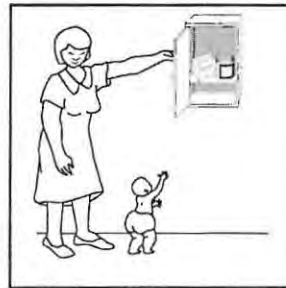


kufutshane nomlilo

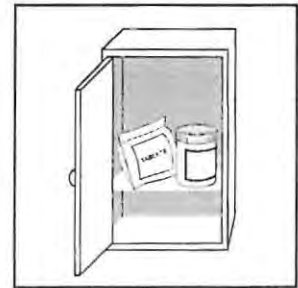


kwigumbi lokuhlambela

Gcina Amayeza akho...



kwindawo abangenakufikelela kuyo abantwana.



kwindawo ekhuselekilyo, epholileyo neyomileyo

Kufuneka uzitye ii-ARVs ubomi bakho bonke

Usenokuyisasaza kwakhona iHIV/AIDS ngokulala neqabane lakho ngaphandle kokuzikhusela.

Kufuneka usebenzise ikhondom ngalo lonke ixesha ulala nomntu ukwenzela ukuzikhusela wena nabanye.



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APPENDIX D4

Patient Information Leaflets: Portrait PIL with side effects pictograms

UNYANGO NGEE-ANTIRETROVIRALS (ARV)

Inkcazelo-sigulane nge Regimen 1a

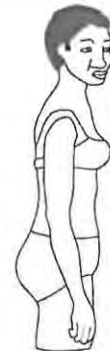
Lenkcazelo ikweliphethshana ingaluncendo kuwe ngedlela eyiyo yokuthabatha ii-ARVs ukuze uhlale usempilweni ngokukhawuleza.

II-ARV ZISETYENZISELWA NTONI?

Ii-ARV aziyinyangi iHIV/AIDS (ugawulayo nentsholongwane yakhe)

- Zicothisa ukukhula kweHIV
- Ziphelisa umonakalo owenziwa yiHIV kumajoni akho omzimba (zisebenza njengamajoni akhusela umzimba)
- Zinyusa iCD4 count yakho (iiseli ezilungileyo) ze zithobe umthamo wentsholongwane kagawulayo egazini lakho.

Phambi kokuthabatha iiARVs
↓ Isimo se CD4 count



Ngexesha uthabatha iiARVs
↑ Isimo se CD4 count

PHAMBI KOKUBA USEBENZISE II-ARV ZAKHO

Xelela ugqirha, usokhemesti okanye unesi ukuba:

- akhona amanye amayeza owathathayo
- kukho enye into engemanga kakuhle empilweni yakho
- kukho amayeza, ukutya okanye naziphi na ezinye izinto ezingavaniyo nomzimba wakho
- ukhulelwe okanye uyazama
- uyancancisa
- uyacwangcisa ngeepilisi okanye ngenaliti.

NGELI XA USEBENZISA II-ARV

Akhona amanye amayeza owathathayo?

Kufuneka uxelele usokhemesti wakho ukuba usebenzisa amanye amayeza, eminye imixube. Amayeza ezinye owathatha:



PHARMACY

ekhemesti

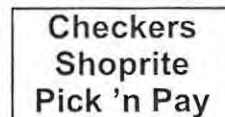


SPAZA

espaza okanye



eggirheni



esuphamakethi



ikliniki

Ukuba uye walibala ukuthatha amayeza akho...

- wathathe nxa uwakhumbula.

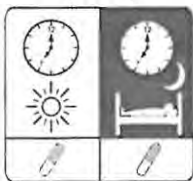
Musa ukwabelana ngamayeza akho...

- nabahlobo bakho nefemeli yakho.



INDLELA YOKUTHATHA II-ARV ZAKHO

Stavudine (d4T)



Thatha ipilis ibe nye kusasa, nenyefuthi ebusuku.

Lamivudine (3TC)



Thatha ipilis ibe nye kusasa, nenyefuthi ebusuku.

Efavirenz (EFV)



Thatha ipilis ibe nye ebusuku



- Amayeza akho wathathe ngexesha elinye yonke imihla
- Wasele amayeza akho emva kokutya makukhoneka, uwasele neglasi yamanzi acocekileyo
- Kufuneka rhoqo uthathe omathathu amayeza wakho.

IZIPHUMO EBEZINGALINDELEKANGA

- Iziphumo ezingalindelekanga zizinto eziyizevele ngelilixa utya amayeza, kodwa ke ziyalawuleka kwaye ziyanyangeka.
- Usenokungabi nazo ezizinto zichazwe apha okanye uphathwe zezo zingachazwanga apha.
- Ukuba uva into engaqhelekanga ngelilixa utya ii-ARVs okanye uphawula nayiphina kwezizinto zilandelayo xelela u Sister wase clinic kwakamsinyane.

Iiveki ezi 2 zokuqala emva kokuba usitya ii-ARVs:

Isicaphucaphu nokugabha



Isisu esihambisayo



Irrhashalala



Iziyezi



Intloko



Isisu esilumayo

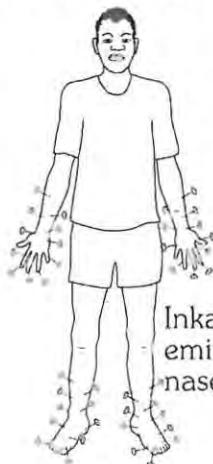


Amaphupha amabi

Emva kwenyanga ezi 3 ukuya kwezi 6 usitya ii-ARVs:



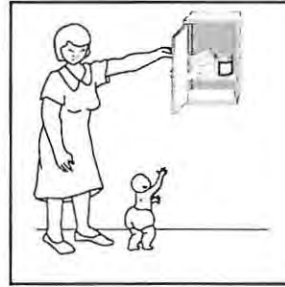
Ubuthatthatka, ukukhatala, Isisu esilumayo nokughaba



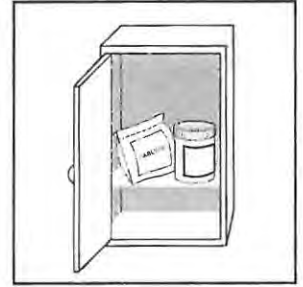
Inkantshi eminwenni nasezinwaneni

INDLELA YOKUGCINA II-ARV

Gcina Amayeza akho...

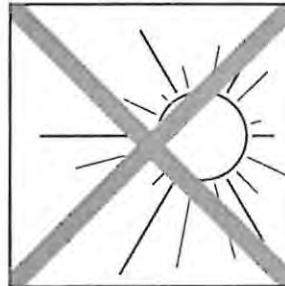


kwindawo abangenakufikelela kuyo abantwana.

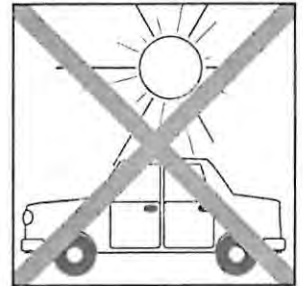


kwindawo ekhuselekilyo, epholileyo neyomileyo

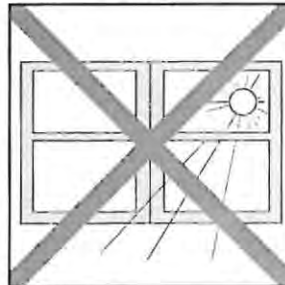
Musa ukuzigcina ii-ARV...



elangeni



emotweni



efestileni



kufutshane nomlilo



kwigumbi lokuhlambela

Kufuneka uzitye ii-ARVs ubomi bakho bonke

Usenokuyisasaza kwakhona iHIV/AIDS ngokulala neqabane lakho ngaphandle kokuzikhusela.

Kufuneka usebenzise ikhondom ngalo lonke ixesha ulala nomntu ukwenzela ukuzikhusela wena nabanye.



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APPENDIX E

Questionnaires

APPENDIX E1

Pictogram study: Step1 Questionnaire

QUESTIONNAIRE – SIDE EFFECT PICTOGRAMS

[November 2007]

Respondent Name: _____

 1

Section 1: Demographics

1.1 Gender

Male ¹	Female ²
-------------------	---------------------

 2

1.2 Race

Black ¹	White ²	Coloured ³	Indian ⁴
--------------------	--------------------	-----------------------	---------------------

 3

1.3 Age

18 - 29 ²	30 - 39 ³	40 - 50 ⁴	> 50
----------------------	----------------------	----------------------	------

 4

1.4 Highest qualification

≤ Grade 3 ¹	Grade 4 - 7 ²	Grade 8 - 10 ³
------------------------	--------------------------	---------------------------

 5

1.5 Home language

isiXhosa ¹	English ²	Afrikaans ³	Other ⁴
-----------------------	----------------------	------------------------	--------------------

 6

If other, please specify

1.7 Are you currently employed?

Yes ¹	No ²
------------------	-----------------

 7

1.8 If yes, what work do you do?

Clerical ¹	Farm ²	Domestic ³	Education ⁴
Mechanic ⁵	Shop assistant ⁶	Hospital ⁷	Self-employ ⁸
Unemployed ⁹		Other ¹⁰	

 8

If other, please specify

1.9 Can you tell the time from a clock face?

Yes ¹	No ²	Digital only ³
------------------	-----------------	---------------------------

 9

Section 2: Interpretation of pictograms

A marked small image means the image is unacceptable

2.1 Pictogram No. _____

Small image

Correct¹

Incorrect²

 10

2.2 Pictogram No. _____

Small image

Correct¹

Incorrect²

 11

2.3 Pictogram No. _____

Small image

Correct¹

Incorrect²

 12

2.4 Pictogram No. _____

Small image

Correct¹

Incorrect²

 13

2.5 Pictogram No. _____

Small image

Correct¹

Incorrect²

14

2.6 Pictogram No. _____

Small image

Correct¹

Incorrect²

15

2.7 Pictogram No. _____

Small image

Correct¹

Incorrect²

16

2.8 Pictogram No. _____

Small image

Correct¹

Incorrect²

17

2.9 Pictogram No. _____

Small image

Correct¹

Incorrect²

18

2.10 Pictogram No. _____

Small image

Correct¹

Incorrect²

19

2.11 Pictogram No. _____

Small image

Correct¹

Incorrect²

20

2.12 Pictogram No. _____

Small image

Correct¹

Incorrect²

21

2.13 Pictogram No. _____

Small image

Correct¹

Incorrect²

22

2.14 Pictogram No. _____

Small image

Correct¹

Incorrect²

23

2.15 Pictogram No. _____

Small image

Correct¹

Incorrect²

24

2.16 Pictogram No. _____

Small image

Correct¹

Incorrect²

25

2.17 Pictogram No. _____

Small image

Correct¹

Incorrect²

26

2.18 Pictogram No. _____

Small image

Correct¹

Incorrect²

27

2.19 Pictogram No. _____

Small image

Correct¹

Incorrect²

28

Score: Q2.1 – Q2.19 Correct = 1 Incorrect = 0; Total = 19

Total

29

Additional notes

Section 3: Opinion of pictograms

3.1 Do you think pictograms would help you in remembering info about medicines e.g. how to take/store, side effects?

Yes¹

No²

30

3.3 Would you like to have pictograms on all your medicine labels and information pamphlets?

Yes¹

No²

31

3.4 Should the pictograms show both females and males?

Yes¹

No²

32

3.5 If we only show one, should it be the male or the female?

Female¹

Male²

Either³

33

Thank you

APPENDIX E2

Pictogram study: Step2 Questionnaires

QUESTIONNAIRE – SIDE EFFECT PICTOGRAMS

[April 2008]

Respondent Name: _____

 1

Section 1: Demographics

1.1 Gender

Male ¹	Female ²
-------------------	---------------------

 2

1.2 Race

Black ¹	White ²	Coloured ³	Indian ⁴
--------------------	--------------------	-----------------------	---------------------

 3

1.3 Age

18 - 29 ²	30 - 39 ³	40 - 50 ⁴	> 50
----------------------	----------------------	----------------------	------

 4

1.4 Highest qualification

≤ Grade 3 ¹	Grade 4 - 7 ²	Grade 8 - 10 ³
------------------------	--------------------------	---------------------------

 5

1.5 Home language

isiXhosa ¹	English ²	Afrikaans ³	Other ⁴
-----------------------	----------------------	------------------------	--------------------

 6

If other, please specify

1.7 Are you currently employed?

Yes ¹	No ²
------------------	-----------------

 7

1.8 If yes, what work do you do?

Clerical ¹	Farm ²	Domestic ³	Education ⁴
Mechanic ⁵	Shop assistant ⁶	Hospital ⁷	Self-employ ⁸
		Unemployed ⁹	Other ¹⁰

 8

If other, please specify

1.9 Can you tell the time from a clock face?

Yes ¹	No ²	Digital only ³
------------------	-----------------	---------------------------

 9

Section 2: Interpretation of pictograms

A marked small image means the image is unacceptable

2.1 Pictogram No. _____

Small image

Correct¹

Incorrect²

 10

2.2 Pictogram No. _____

Small image

Correct¹

Incorrect²

 11

2.3 Pictogram No. _____

Small image

Correct¹

Incorrect²

 12

2.4 Pictogram No. _____

Small image

Correct¹

Incorrect²

 13

2.5 Pictogram No. _____

Small image

Correct¹

Incorrect²

14

2.6 Pictogram No. _____

Small image

Correct¹

Incorrect²

15

2.7 Pictogram No. _____

Small image

Correct¹

Incorrect²

16

2.8 Pictogram No. _____

Small image

Correct¹

Incorrect²

17

2.9 Pictogram No. _____

Small image

Correct¹

Incorrect²

18

2.10 Pictogram No. _____

Small image

Correct¹

Incorrect²

19

2.11 Pictogram No. _____

Small image

Correct¹

Incorrect²

20

2.12 Pictogram No. _____

Small image

Correct¹

Incorrect²

21

2.13 Pictogram No. _____

Small image

Correct¹

Incorrect²

22

2.14 Pictogram No. _____

Small image

Correct¹

Incorrect²

23

2.15 Pictogram No. _____

Small image

Correct¹

Incorrect²

24

2.16 Pictogram No. _____

Small image

Correct¹

Incorrect²

25

2.17 Pictogram No. _____

Small image

Correct¹

Incorrect²

26

2.18 Pictogram No. _____

Small image

Correct¹

Incorrect²

27

2.19 Pictogram No. _____

Small image

Correct¹

Incorrect²

28

Score: Q2.1 – Q2.19 Correct =1 Incorrect = 0; Total =19

Total

29

Additional notes

Section 3: Opinion of pictograms

3.1 Do you think pictograms would help you in remembering info about medicines e.g. how to store them, side effects?

Yes¹

No²

30

3.2 Now that we have told you that both of these show peripheral neuropathy (pins and needles) which of these show it better?

Pins¹

Arrows²

31

3.3 Would you like to have pictograms on all your medicine labels and information pamphlets?

Yes¹

No²

32

Thank you

Key

Places = places to buy medicines

Sharing = sharing medicines 20

Sharing 2 = sharing medicines 19

LA = lactic acidosis

PN1 = peripheral neuropathy 15

PN2 = peripheral neuropathy 21

HQ = highest qualification

APPENDIX E3

Patient Information Leaflet: Questionnaires

QUESTIONNAIRE: UNDERSTANDING OF ARV PIL

Thato Ramela: 2008

Interviewer: _____

Date: _____

Respondent Name: _____

Interview site: _____

SECTION 1: DEMOGRAPHICS

1.1 Gender

Male ¹	Female ²
-------------------	---------------------

1.2 Race

Black ¹	White ²	Coloured ³	Indian ⁴
--------------------	--------------------	-----------------------	---------------------

1.3 Age

18 – 29 ¹	30 – 39 ²	40 – 50 ³	> 50 ⁴
----------------------	----------------------	----------------------	-------------------

1.4 Highest qualification

≤ Grade 3 ¹	Grade 4 - 7 ²	Grade 8 - 10 ³
------------------------	--------------------------	---------------------------

1.5 Home language

isiXhosa ¹	Afrikaans ²	English ³	Other ⁴
-----------------------	------------------------	----------------------	--------------------

If other, please specify

1.6 Are you currently employed?

Yes ¹	No ²
------------------	-----------------

1.7 If yes, what work do you do?

Clerical ¹	Farm ²	Domestic ³	Education ⁴
Mechanic ⁵	Shop assistant ⁶	Hospital ⁷	Self-employ ⁸
Unemployed ⁹		Other ¹⁰	

If other, please specify

1.8 Can you tell the time from a clock face?

Yes ¹	No ²	Digital only ³
------------------	-----------------	---------------------------

SECTION 2: LITERACY TEST

The patient is given a medicine label and instructions to read

2.1 How many teaspoons must you take when you start this medicine?

Correct ¹	Incorrect ²
----------------------	------------------------

2.2 How many teaspoons must you take each time thereafter?

Correct ¹	Incorrect ²
----------------------	------------------------

2.3 If you take this medicine at 12:30 pm when can you start eating your lunch? *

Correct ¹	Incorrect ²
----------------------	------------------------

2.4 Does the label say that you can't drink milk or water when taking this medicine? *

Correct ¹	Incorrect ²
----------------------	------------------------

2.5 Will you keep any medicine to use next time you get sick?

Correct ¹	Incorrect ²
----------------------	------------------------

2.6 How often must you take this medicine?

Correct ¹	Incorrect ²
----------------------	------------------------

2.7 What can this medicine do to your teeth?

Correct ¹	Incorrect ²
----------------------	------------------------

2.8 How should this medicine be stored?

Correct ¹	Incorrect ²
----------------------	------------------------

2.9 Literacy rating

--

**these are weighted therefore total literacy rating out of 10*

SECTION 3: UNDERSTANDING OF PATIENT INFORMATION LEAFLET

3.1.1. Language of reading PIL

Xhosa ¹	English ²
--------------------	----------------------

3.1.2 Time taken to read the leaflet in minutes?

--

3.2 Finding and Understanding of instructions (according to the leaflet)

Participant to first locate the information and then to explain it

3.2.1. Can you show me the names of the medicines in the leaflet?

Located ¹	Not located ²
Correct ¹	Incorrect ²

Can you tell me the names?

3.2.2. Can a person spread AIDS to other people while taking ARVs?

Located ¹	Not located ²
Correct ¹	Incorrect ²

Can you tell me in your own words?

3.2.3 How many times a day must a person take efavirenz, according to the leaflet?

Located ¹	Not located ²
Correct ¹	Incorrect ²

Can you tell me in your own words?

3.2.4 Will the HIV go away for good when a person takes ARVs?

Located ¹	Not located ²
Correct ¹	Incorrect ²

Can you tell me in your own words?

3.2.5 Like other medicines, these medicines have both good and bad effects.

Does the leaflet tell you what some of these side effects are?

Located ¹	Not located ²
Correct ¹	Incorrect ²

Can you tell me in your own words?

3.2.6 What do these medicines do to the amount of virus (viral load) in the body?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.7 Will someone taking ARVs usually experience ALL these side effects?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.8 Is there anything a person taking ARVs should do before taking these other medicines?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.9 How many of the lamivudine (3TC) tablets should a person take each time?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.10 For how long does a person have to take these medicines?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.11 Is there anything a person should do if they experience side effects?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.12 Where should a person keep medicines?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.13 Give me an example of side effects that will show when a person first starts taking ARVs?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.14 What happens to the good cells (CD4 cells) when a person starts taking the medicine?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.15 Give me an example of the side effects that will happen after a few months of taking ARVs?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.16 What should a person do when they miss a dose of ARVs?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.17. Can your friend or brother who is also HIV positive and has extra ARVs give you some of his when you do not have any ARVs?

Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.18 Does this list of side effects it show ALL the side effects one
Can experience when taking ARVs or are there others?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.19 Would all side effects happen soon after starting ARVs?
Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.2.20 Earlier we asked you where a person should keep medicine. Now,
where shouldn't a person keep the medicines?
Can you tell me in your own words?

Located ¹	Not located ²
Correct ¹	Incorrect ²

3.3 Questions answered correctly

3.3.1 No. of questions answered correctly

a. Located (total = 20)

b. Understood (total 20)

3.4 Rating for understanding of the leaflet

Both located and understood
Total score = 40

SECTION 4: ACCEPTABILITY OF PATIENT INFORMATION LEAFLET

4.1 How easy was it to read the leaflet?

Easy ¹	Average ²	Difficult ³
-------------------	----------------------	------------------------

4.2 Is the writing large enough?

Yes ¹	No ²
------------------	-----------------

4.3 What do you think of the length of the sentences?

Too long ¹	Right ²	Too short ³
-----------------------	--------------------	------------------------

4.4 Is there enough space between the lines?

Yes ¹	No ²
------------------	-----------------

4.5 If you had just started taking these medicines and this was all the
information you were given about them, do you think it would be enough?

Yes ¹	No ²
------------------	-----------------

4.6 Are there any words in the text that you did not understand?

Yes, a few ¹	Yes, many ²	No ³
-------------------------	------------------------	-----------------

(if there are some words they should mention or point to them)

Words not understood: _____

4.7 Number of words not understood

4.8 Pointing to CD4 count image

What do you think this picture means?

Correct ¹	Incorrect ²
----------------------	------------------------

4.9 Do you like having pictures in the leaflet?

Yes ¹	No ²
------------------	-----------------

4.10 What do you think about the size of the pictures?

Too big ¹	Right size ²	Too small ³
----------------------	-------------------------	------------------------

4.11 Do you think the pictures will help you understand and remember the information better?

Yes ¹	No ²
------------------	-----------------

4.12 Were there any pictures you did not understand?

Yes, a few ¹	Yes, many ²	No ³
-------------------------	------------------------	-----------------

(if there are some images they should mention or point to them)

Pictures not understood: _____

4.13 Number of pictures not understood

--

4.14 Do you prefer the way the leaflet looks?

Yes ¹	No ²
------------------	-----------------

Show both the portrait and landscape PILs

4.15 Which of these do you prefer?

Portrait	landscape
----------	-----------

General comments:

Do you like or dislike anything about the leaflet?

Thank you

