ART ADHERENCE

Sandy Pillay

Enhancing Care Initiative
Nelson Mandela School of Medicine
University of KwaZulu Natal
Contents

- Background
- Why is adherence to ART important
- Measuring adherence to ART
- Adherence to ART in sub-Saharan Africa
- The IMB model for behaviour change
- Application of the IMB model for ART adherence
BACKGROUND
## Key Indicators of Progress in Low- and Middle-income Countries 2008/2009

<table>
<thead>
<tr>
<th>Indicator</th>
<th>December 2008</th>
<th>December 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of adults and children receiving ART</td>
<td>4,053,000</td>
<td>5,254,000</td>
</tr>
<tr>
<td>ART coverage among adults and children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Based on 2010 WHO guidelines (CD4 &lt; 350)</td>
<td>28% [26-31%]</td>
<td>36% [33-39%]</td>
</tr>
<tr>
<td>Based on 2006 WHO guidelines (CD4 &lt; 200)</td>
<td>42% [38-48%]</td>
<td>52% [47-58%]</td>
</tr>
<tr>
<td>ART coverage among children &lt; 15 years</td>
<td>22% [16-34%]</td>
<td>28% [21-43%]</td>
</tr>
<tr>
<td>% of pregnant women living with HIV receiving ART for PMTCT</td>
<td>45% [37-57%]</td>
<td>53% [40-79%]</td>
</tr>
</tbody>
</table>

*SOURCE: Towards Universal Access. Progress Report 2010*
No. receiving ART vs no. needing ART

<table>
<thead>
<tr>
<th>Geographical region</th>
<th>As of December 2009</th>
<th>As of December 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of people receiving antiretroviral therapy</td>
<td>Estimated number of people needing antiretroviral therapy, based on WHO 2010 guidelines [range]</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>3,911,000</td>
<td>10,600,000 [9,700,000-11,500,000]</td>
</tr>
<tr>
<td>Eastern and Southern Africa</td>
<td>3,203,000</td>
<td>7,700,000 [7,200,000-8,300,000]</td>
</tr>
<tr>
<td>Western and Central Africa</td>
<td>709,000</td>
<td>2,900,000 [2,500,000-3,200,000]</td>
</tr>
</tbody>
</table>

**SOURCE:** Towards Universal Access. Progress Report 2010
## Progress in ART coverage

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>South Africa</td>
<td>730 183</td>
<td>971 556</td>
<td>56% [48%-65%]</td>
<td>37% [35%-39%]</td>
<td>33%</td>
</tr>
<tr>
<td>Kenya</td>
<td>250 576</td>
<td>336 980</td>
<td>65% [55%-79%]</td>
<td>48% [42%-55%]</td>
<td>34%</td>
</tr>
<tr>
<td>India</td>
<td>234 581</td>
<td>320 074</td>
<td>41% [36%-46%]</td>
<td>26% [23%-28%]</td>
<td>36%</td>
</tr>
</tbody>
</table>

**SOURCE:** Towards Universal Access. Progress Report 2010
Why is adherence to ART important?
Why is adherence to ART important?

- Adherence determines biologic, clinical and public health outcomes
- Proper adherence to ARVs can lead to:
  - CD4 counts
  - Viral load
  - Mortality
- Poor adherence is a major cause of ART failure
- No other infectious disease requires difficult life-long therapy
- Without resources and expertise to support adherence, ART can be ineffective, wasteful and dangerous
Adherence to antiretroviral therapy and virologic failure

Patterson, Annals of Internal Medicine, 2000
Rates of Virological Suppression at 24 Weeks by Adherence (PI regimen)
Measuring adherence to ART
Common measures and methods for monitoring adherence

- Self report of doses/pills taken
  - Single item measures
  - Scale measures
- Pill counts
- Pharmacy records
- Electronic monitoring
- Biological measures
ACTG and other dose/pills taken or missed measures are likely the most commonly used measure of adherence in research conducted to date.
Self report of doses/pills taken or missed

CPCRA form also looks at each agent in a regimen but instead of counting doses taken, adherence to rated on a scale.
Self report of doses/pills taken or missed

SINGLE ITEM BY AGENT

VISUAL ANALOG SCALE

How much of this medication have you taken as prescribed in the last three to four weeks?

0% means you have taken none of this medication
50% means you have taken half of this medication
100% means you have taken every single dose of this medication
Self report of doses/pills taken or missed

SINGLE ITEM - OVERALL ADHERENCE

VISUAL ANALOG SCALE

About how much of your HIV medications have you taken as prescribed in the last three to four weeks?

0% means you have taken none of this medication
50% means you have taken half of this medication
100% means you have taken every single dose of this medication

Likert Single Item

About how much of your HIV medications have you taken as prescribed in the last week?

☐ ALL
☐ MOST
☐ HALF
☐ FEW
☐ NONE
**Self report of doses/pills taken or missed – scales**

### Morisky Scale

1. Do you ever forget to take your medicine?  
   - Yes
   - No

2. Are you careless at times about taking your medicine?  
   - Yes
   - No

3. When you feel better do you sometimes stop taking your medicine?  
   - Yes
   - No

4. Sometimes if you feel worse when you take your medicine, do you stop taking it?  
   - Yes
   - No
Self report of doses/pills taken or missed – scales

SCALES FOR OVERALL ADHERENCE

Swiss HIV Cohort Study- Adherence Questionnaire (SHCS-AQ)

Over the last 4 weeks

- How often did you miss a dose of your HIV-medications?
  1) Daily
  2) More than once a week
  3) Once a week
  4) Once every second week
  5) Once a month
  6) Never

- Did you forget 2 doses one after the other
  - Yes
  - No

SCORING

< 100% Taking adherence or ≥ 1 drug holiday
Pharmacy Refills

PHARMACY REFILL

DATA REQUIRED
Fill date
Prescribed dose
Pills dispensed

FILL DATE
FILL DATE
FILL DATE

Calculate

1. COVERED
   Pills – Doses – Days covered from medication dispensed

2. REQUIRED
   DAYS elapsed from START FILL DATE to END FILL DATE
   (as days, total pills required, or total doses required depending on metric used in numerator)
Electronic Monitoring

- ELECTRONIC MONITORING
ELECTRONIC MONITORING
Adherence to ART in Sub-Saharan Africa
Mills et al. (2006) conducted a meta-analysis to assess ARV adherence levels in North America vs. Sub-Saharan Africa.

- Results – Adequate ARV adherence levels:
  - 55% of North American population samples
  - 77% of Sub-Saharan population samples
## Rates of Adherence in SSA

<table>
<thead>
<tr>
<th>Study</th>
<th>Number pts (method)</th>
<th>Adherence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senegal¹</td>
<td>900 (self report)</td>
<td>92%</td>
</tr>
<tr>
<td>Uganda²</td>
<td>221 (self report)</td>
<td>88%</td>
</tr>
<tr>
<td>South Africa³</td>
<td>289 (pill count)</td>
<td>87%</td>
</tr>
</tbody>
</table>

¹ Diop et al IAS 2003
² Weidle et al Lancet 2002
³ Orrell et al AIDS 2003
Adherence to ARVs in SSA

Why were the Sub-Saharan patients better at adhering to ARVs?

Possible explanations (Mills et al., 2006):

- Samples based on select patients with early access to treatment
- Patients early in therapy experienced dramatic increases in health
- Long-term negative effects of therapy had not yet occurred
- Less complex regimens
- DOT and treatment supporters
Facilitators of ARV Adherence in Sub-Saharan African Populations

- Dramatic improvements in health
- Obligation to one’s family; parenthood
- Strategies to remember to take pills; routines associated with pill taking
- Receiving social support from others
- Receiving instrumental support from others
- Healthcare provider support and trust

Adapted from Aspeling et al., 2008; Mills et al., 2006; Nachega et al., 2004, 2006; Ware et al., 2009; Watt et al., 2009
# Reasons for Missing Doses of Antiretroviral Therapy

<table>
<thead>
<tr>
<th>US</th>
<th>Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chesney</td>
<td>Weidle, Orrell, Nachegg, Brown</td>
</tr>
<tr>
<td>Simply forgot</td>
<td>Forgot</td>
</tr>
<tr>
<td>Slept through dose</td>
<td>Away from home</td>
</tr>
<tr>
<td>Away from home</td>
<td>Schedule difficulties</td>
</tr>
<tr>
<td>Change in routine</td>
<td>Ran out of pills</td>
</tr>
<tr>
<td>Busy with other things</td>
<td>Cost</td>
</tr>
<tr>
<td>Too sick</td>
<td>Fear of stigmatization by sexual partner</td>
</tr>
<tr>
<td>Depressed</td>
<td></td>
</tr>
</tbody>
</table>
Barriers to ART Adherence in Sub-Saharan African Populations

- Money for food, transport, medications
- HIV-related stigma
- Disclosure of HIV status
- Lack of social support
- Changes in daily routine
- Alcohol abuse
- Depression
- Complex regimens

Adapted from Aspeling et al., 2008; Mills et al., 2006; Nachega et al., 2004, 2006; Ware et al., 2009; Watt et al., 2009
The Information-Motivation-Behavioural Skills (IMB) Model

Fisher & Fisher, 1992
The IMB Model

Information

Motivation

Behavioural Skills

Behaviour
The Information-Motivation-Behavioural Skills (IMB) Model of ARV Adherence

Fisher et al., 2006
The IMB Model of ARV Adherence

ARV Adherence Information

ARV Adherence Motivation

ARV Adherence Behavioural Skills

Adherence Behaviour

Moderating Factors

Health Outcomes

(Fisher et al., 2006)
Information about:
- One’s regimen
- Correct ARV utilization and adequate adherence
- Side effects and drug interactions
Adherence Motivation

- **Personal motivation**
  - Attitudes/beliefs about ARVs
  - Attitudes/beliefs about outcomes of adherence/non-adherence

- **Social Motivation**
  - Perceptions of significant others’ support
  - Motivation to comply with significant others’ support
Adherence Behavioural Skills

- Skills for:
  - Acquiring and self cueing, self administering ARVs
  - Incorporating ARVs into daily life
  - Minimizing side effects
  - Acquiring support from others for adherence
  - Self-reinforcement of adherence over time
Proper dosing
Optimal or greater adherence
Health Outcomes

- Viral load and CD4
- Drug resistance
- Objective and subjective health
Moderating Factors

- Depression
- Substance use
- Access to care
- Living situation
The IMB Model of ARV Adherence
Support for the IMB Model:

*ARV Adherence*
Optimal Adherence

100 Italian HIV Positive Patients

Adherence-Related Information

Adherence-Related Motivation

Adherence-Related Behavioural Skills

Adherence
1 Optimal (≥ 95%);
0 Suboptimal (< 95%)

Optimal Adherence
200 HIV Positive Patients in San Juan, Puerto Rico

Adherence-Related Information

Adherence-Related Motivation

Adherence - Related Behavioural Skills

Adherence
1 Optimal (≥ 95%);
0 Suboptimal (< 95%)

Putting the IMB Model into Action
Phase I:
Elicitation Research

Phase II:
Individually Tailored IMB Intervention

Phase III:
Evaluation/Outcome Research
Using the IMB Model as a Framework for Reducing Risky Behaviour:

*The Options Study*
Phase I: Elicitation Research

- Patient and Healthcare Provider Focus Groups

- Informational Barriers:

  - Patients were generally knowledgeable about HIV and condoms
  - Undetectable viral load = not infectious
  - No risk of HIV reinfection (drug resistant strains)
  - Difficulty transmitting HIV from a woman to a man
  - Partners factors (e.g., willingness to not use condoms)
Phase I: Elicitation Research

- **Motivational Barriers:**
  - Negative condom attitudes
  - Desire for intimacy
  - Fear of abuse

- **Behavioural Skills Barriers:**
  - Negotiating condoms
  - Using condoms under the influence of alcohol/drugs
Phase II: Tailored IMB Intervention

**Setting:**
- Counselors were chosen as the most appropriate people to deliver intervention

**Intervention Design:**
- Motivational interviewing techniques were seen as the ideal delivery mechanism for the intervention
- Counselor-patient “conversations” would last approx. 5-10 minutes and take place at each regularly scheduled visit
Tailored IMB Intervention Options Intervention Intervention Intervention Pilot Study:

McCords Hospital
Durban, KZN
Effects of the Izindlela Zokuphila Intervention on Risky Sexual Behaviour

Event Rate Ratio = 1.95 (1.1 - 3.83)

Estimated mean number of unprotected sex events

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>6-Month Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Baseline and 6-month follow-up estimated mean number of unprotected sex events for the intervention and control groups.
Using the IMB Model as a Framework for Promoting ARV Adherence:

The LifeWindows Intervention
PHASE I - Focus groups with HIV+ Patients

Barriers to Adherence:

- Side effects of HIV medications
- Difficulty incorporating HIV medications into daily life
- Fear of revealing HIV status if others see one taking one’s HIV medications
- Believing that HIV medications are toxic
- Problems swallowing pills
- Alcohol, drug use, stress, and depression
# PHASE I - Questionnaires completed by HIV+ Patients

<table>
<thead>
<tr>
<th>Barrier to Adherence</th>
<th>% HIV+ Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not having information/not knowing about the side effects of one’s HIV medications</td>
<td>84%</td>
</tr>
<tr>
<td>Believing that as long as one feels healthy, one is taking enough HIV medication</td>
<td>78%</td>
</tr>
<tr>
<td>Difficulties dealing with side effects/concern about the side effects of HIV medications</td>
<td>61%</td>
</tr>
<tr>
<td>Having a difficult time taking HIV medications when one’s routine changes</td>
<td>58%</td>
</tr>
<tr>
<td>Having a difficult time taking HIV medications when one does not feel good emotionally</td>
<td>58%</td>
</tr>
</tbody>
</table>
### PHASE I - Questionnaires completed by HIV+ Patients (continued)

<table>
<thead>
<tr>
<th>Barrier to Adherence</th>
<th>% HIV+ Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiencing frustration from having to plan one’s life around taking HIV medications</td>
<td>54%</td>
</tr>
<tr>
<td>Worrying that taking HIV medications can hurt one’s health</td>
<td>54%</td>
</tr>
<tr>
<td>Not understanding how HIV medications work to fight HIV inside the body</td>
<td>53%</td>
</tr>
<tr>
<td>Concern that taking HIV meds can affect the way one looks</td>
<td>46%</td>
</tr>
</tbody>
</table>
Phase II: IMB-Based Intervention Development - “LifeWindows”

- LifeWindows is a highly **personalized** and **interactive** software program
- LifeWindows assesses patients’ specific barriers to adherence and then provides them with a **tailored** list of strategies and activities to work on
- LifeWindows sessions take less than one hour to complete
- Participants interact with LifeWindows on an ongoing basis
LifeWindows: Program Flow

- Tutorial
- Assessment
- Goal Evaluation*
- Strategy Selection*
- Intervention Selection*
- Intervention*
- Goal Setting*

* Intervention condition only

- A brief tutorial instructs participants on how to navigate within the LifeWindows environment
LifeWindows: Program Flow

- Tutorial
- **Assessment**
  - Goal Evaluation*
  - Strategy Selection*
  - Intervention Selection*
  - Intervention*
  - Goal Setting*

- *Intervention condition only

- Demographics
- Physical and mental health (SF-8)
- IMB deficits associated with non-adherence
- Self-reported ARV regimen
- Self-reported ARV adherence
LifeWindows: Program Flow

- Tutorial
- Assessment
- Goal Evaluation*
- Strategy Selection*
- Intervention Selection*
- Intervention*
- Goal Setting*

* Intervention condition only

- Based on their IMB deficits, participants are provided with a tailored list of adherence-promoting strategies
After selecting a strategy, participants are given a list of strategy-specific interventions and are asked to choose one.
LifeWindows: Program Flow

- Tutorial
- Assessment
- Goal Evaluation*
- Strategy Selection*
- Intervention Selection*
- Intervention*
- Goal Setting*

- A total of 20 different interventions address adherence-related IMB deficits
- Participants can explore interventions at their own pace

* Intervention condition only
LifeWindows: Program Flow

- **Tutorial**
- **Assessment**
- **Goal Evaluation**
- **Strategy Selection**
- **Intervention Selection**
- **Intervention**
- **Goal Setting**

*Intervention condition only*

- Participants are asked to 1) set an adherence-related goal and 2) try to accomplish the goal before their next LifeWindows session.
LifeWindows: Program Flow

- Tutorial
- Assessment
- Goal Evaluation*
- Strategy Selection*
- Intervention Selection*
- Intervention*
- Goal Setting*

* Intervention condition only

• Participants are asked about their progress toward the goal they set during their previous LifeWindows session.
Examples of LifeWindows IMB-Based Interventions
Positive Voices: People Living With HIV

STEP 1: Click on a question
STEP 2: Click on a person

Your Question
Click on any question, then select a person who is highlighted in color.

- What strategies do you use to help you take your HIV medications as prescribed?
- How do you deal with taking your HIV medications when other people are around?
- What would you say to people who are taking HIV medications and continue to drink alcohol or use street drugs?
- How do you stay motivated to take your medications every day?
- How do you manage to keep taking your medications when you feel lousy?
STEP 1: Click on a question
STEP 2: Click on a doctor

importance of taking all of your hiv medications

- how do medications affect a person's viral load and t-cells?
- why is it important for people to take their hiv medications as prescribed?
- should a person ever stop taking just one of their hiv medications?
- what happens when you miss doses of your hiv medications?
- as long as a person is feeling healthy, is it okay for them to miss a dose of their hiv medication?
Side Effects: Specific side effects

- Hair Loss
- Memory and Thinking Problems, Nightmares, Trouble Sleeping
- Headaches, Fever
- Skin Problems
- Altered Taste, Dry Mouth, Fungal Infection, Mouth Sores or Ulcers
- Lactic Acidosis, Heartburn
- Anemia, Leukopenia/Neutropenia
- Muscle & Joint Pain
- Anorexia, Fatigue, Lipodystrophy, Weight Loss
- Nausea & Vomiting
- Metabolic Disorders, Pancreatitis
- Liver Damage
- Kidney Stones
- Diarrhea, Gas or Flatulence
- Menstrual or Period Disorders
- Neuropathy (Numbness & Tingling)
- Metabolic Disorders
- Pancreatitis

Select One:
- Metabolic Disorders
- Pancreatitis
This and additional information can also be found by calling 211 or by going to www.infoline.org.
Simple approaches to improve adherence in clinical practice

- Simplify and explain treatment regimen
- Discuss side effects – put into perspective
- Open communication between practitioner and patient
- Promote organisational skills
- Promote social support
- Treat depression
- Medication tracking aids
CONCLUSION

- ART coverage in SA has increased significantly in 2009
- Adherence to ART is associated with better clinical outcomes, reduced treatment failure and lower drug resistance
- There are various barriers to good adherence in resource-limited settings
- The IMB model provides a good fit for the understanding of adherence behaviour
- The IMB model can be used effectively to promote good adherence
Thank you