Optimizing Biomedical HIV Prevention with Complementary Behavioral Strategies

Ralph DiClemente and Gina Wingood, Emory University
Recent advances in biomedical interventions to prevent HIV transmission
FDA Advisory Panel recommended approving Truvada to prevent HIV infection (2012)
Enhance Knowledge and Awareness of HIV Biomedical Interventions.

TREATMENT OF STIs.

PROVISION OF MALE CIRCUMCISION.

CONDOMS.

POSITIVE LIVING FOR PEOPLE WITH HIV/AIDS.

VOLUNTARY HIV COUNSELING AND TESTING.
Recent Advances in Biomedical Treatment for HIV Prevention

Clinical Trial Evidence of Efficacy for Prevention of Sexual transmission of HIV

<table>
<thead>
<tr>
<th>Study</th>
<th>Effect size (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART in discordant couples (HPTN 052)</td>
<td>96% (73; 99)</td>
</tr>
<tr>
<td>PrEP in discordant heterosexual couples (Partners PrEP)</td>
<td>73% (49; 85)</td>
</tr>
<tr>
<td>PrEP for women (Botswana)</td>
<td>63% (21; 48)</td>
</tr>
<tr>
<td>Medical male circumcision (Orange Farm, Rakai, Kisumu)</td>
<td>54% (38; 66)</td>
</tr>
<tr>
<td>PrEP for MSMs (America’s, Thailand, South Africa)</td>
<td>44% (15; 63)</td>
</tr>
<tr>
<td>Microbicide for women (CAPRISA 004 tenofovir gel)</td>
<td>39% (6; 60)</td>
</tr>
<tr>
<td>HIV Vaccine (Thai RV144)</td>
<td>31% (1; 51)</td>
</tr>
</tbody>
</table>
A key challenge to optimizing biomedical interventions is addressing the social realities and co-morbidities of people and communities at risk and living with HIV.
Here is the description of the chart. You may change or delete this text as you wish. This chart is compatible with PowerPoint 97 to 2010. Here is a placeholder for more text and description of the chart. Changing this text will not interfere with the formatting of this template.
Contextual factors force us to tear down the wall between HIV biomedical and behavioral interventions.

Optimizing the impact of biomedical interventions requires us to complement them with behavioral interventions.
Stages of Translational Research

- **Translation 1 (T1)** basic science discoveries are used to develop new treatments for disease ("bench to bedside")

- **Translation II (T2)** improving utilization of proven therapies in clinical practice and community settings ("bedside to public health")
Advances in HIV biomedical interventions fuel the ....

- next generation of HIV behavioral & social science endpoints
Behavioral and Social Science Endpoints to Optimize HIV Biomedical Interventions

- Enhance BMI treatment awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV awareness
- Enhance program sustainability
- Reduce risk compensation
- Enhance access to & retention in care
- Enhance BMI treatment adherence
- Enhance HIV counseling, testing & referral (CTR)
- Enhance acceptability and initial adoption
- Reduce HIV stigma
- Enhance HIV aware
Advances in HIV biomedical interventions fuel the development of innovative behavioral & social science intervention strategies that can be implemented at different levels of influence (e.g. individual/dyadic, organization, policy).
Intervention Strategy

Social Marketing
Got Behavior Change?
Intervention Strategy

Technological Innovations
“DRUGS DON’T WORK IN PEOPLE WHO DON’T TAKE THEM”

Poor adherence is the Achilles’ heel of HIV biomedical interventions

C. Everett Koop
3. Access Proliferation

- Video games
- Email
- XBox LIVE
- Websites
- IM
- Search

- Radio
- DVD
- Ring Tones
- TV
- Blogs
- Magazines

- Satellite Radio
- TiVo (Starhub PVR)
- Video On-Demand
- Newspapers
- Podcasting
- Cell Phone

Source: Darwin Day Conference, Google
SOCIAL NETWORK TOOL KIT

Facebook
twitter
LinkedIn
SU
technorati
flickr

RSS
YouTube
g+
B
W
Y
Intervention Level

Individual-level
“What Did the Doctor Say?” Improving Health Literacy to Enhance Treatment Effectiveness

Failure to provide patients with information about their HIV treatment in ways that they can understand, will undermine efforts to improve patients’ health.
Intervention Level

Provider-level Intervention
ARTAS is a CDC-defined evidence-based intervention.

The goal of ARTAS is to link recently diagnosed persons with HIV to medical care soon after receiving their positive test result.
Intervention Level

Social/Policy Interventions
You can change between static and animated layouts by clicking on the Layout tab in the HOME menu on the ribbon.

For example, this slide uses the static layout.
Advances in HIV biomedical interventions fuel the development of novel behavioral & social science multi-level intervention methods to create more robust and sustained changes in behavior.
Causal Models for Multilevel Intervention Design

Abstract, visual representations that use cause-and-effect logic to describe the behavior of a system.

These models can be used to clarify the process by which a set of interventions (e.g. PrEP, HIV Testing) can achieve a desired goal.
Desired Goal

Increasing physician’s motivation to ensure that individuals at high risk of HIV adhere to their PrEP medication.
A prevention effectiveness gradient is observed; as medication adherence increases to prescribed levels, prevention effectiveness increases (fewer HIV infections).

**Adherence to Orally Administered Truvada and Reduction in New HIV Infections (Grant et al.)**

<table>
<thead>
<tr>
<th>Level of Treatment Adherence</th>
<th>Reduction in HIV Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;90% of days*</td>
<td>73%</td>
</tr>
<tr>
<td>=&gt;50% of days*</td>
<td>50%</td>
</tr>
</tbody>
</table>

*measured by pill counts, bottle counts and self-reports
Tenofovir gel reduced HIV acquisition by an estimated 39% overall and by 54% in women with high gel adherence.

## Adherence to TVF Gel and Reduction in New HIV Infections in CAPRISCA004

<table>
<thead>
<tr>
<th>Level of Gel Adherence</th>
<th>Reduction in HIV Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (&gt; 80%)</td>
<td>54%</td>
</tr>
<tr>
<td>Intermediate (50–80%)</td>
<td>38%</td>
</tr>
<tr>
<td>Low (&lt; 50%)</td>
<td>28%</td>
</tr>
</tbody>
</table>
Models for Combining Interventions (PrEP, HIV Testing) at Different Levels

Strategy: The type of intervention used to enhance medication adherence

Level: The target of influence (individual, social, policy) that the intervention is attempting to modify
Accumulation Multi-level Intervention Model

- Interventions at different levels produce a cumulative impact on a common mediating pathway.

- The effect of each intervention is not conditional on other interventions.

- The interventions exhibit pooled interdependence, each intervention makes a discrete contribution.
Accumulation Model

(Goal: Enhance physician motivation to improve PrEP adherence)

- Strategy: Social Marketing
  Level: (Social)
- Strategy: Opinion Leader
  Level: (Interpersonal)
- Strategy: Outreach visit
  Level: (Individual)

Mediator: Physician Motivation

Outcome: Medication Adherence
Amplification Model

- The effect of one or more interventions is conditional on another intervention.

- One intervention increases the target audience’s sensitivity or receptivity to the other interventions.

- One intervention magnifies the amplitude of the other intervention through a mediating pathway.
Amplification Model
(Goal: Enhance physician motivation to improve PrEP adherence)

Strategy: Social Marketing  
Level (Social)

Strategy: Opinion Leader  
Level (Interpersonal)

Mediator  
Physician Motivation

Outcome  
Medication Adherence

Strategy: Audit & Feedback  
Level (Individual)
Facilitation Model

- Like the amplification strategy, the effect of one or more interventions is conditional on another intervention.

- However, instead of boosting the signal the conditional intervention clears the pathway for the other intervention to produce the desired outcome.

- The intervention removes barriers or facilitates the effect of the other interventions.
Facilitation Model

(Goal: Enhance physician motivation to improve PrEP adherence)

Strategy: Social Marketing
Level: Social

Strategy: Opinion Leader
Level: Interpersonal

Mediator
Physician Motivation

Outcome
Medication Adherence

Strategy: Clinical Reminder
Level: Individual
Cascade Model

- An intervention at one level affects the desired outcome in and through one or more interventions at other levels of influence.

- The interventions exhibit **sequential interdependence**, the outputs of an intervention at one level become the outputs of an intervention at another level.
Cascade Strategy

Goal: Enhance physician motivation to enhance medication adherence

Strategy: Advocacy to enhance access to care
  Level (Policy)

Strategy: Health Care Provider
  Level (Organizational)

Strategy: ARTAS
  Level (Individual)

Physician Motivation

Patient Motivation

Medication Adherence
Convergence Model

- Interventions at different levels mutually reinforce each other by altering patterns of interaction among two or more mediators.

- The interventions exhibit reciprocal interdependence, the outputs of some interventions become the outputs of interventions and vice versa.
Convergence Strategy
(Goal: Enhance physician motivation to improve PrEP adherence)

Strategy: Social Marketing
Level (Social)

Strategy: Opinion Leader
Level (Interpersonal)

Strategy: Health Literacy
Level (Individual)

Physician Motivation

Physician-Patient Interaction

Patient Motivation

Outcome
Medication Adherence
1) What theories or evidence supports the logical-causal case for expecting synergy from the proposed multi-level intervention?
“As far as the laws of mathematics refer to reality, they are not certain, and as far as they are certain, they do not refer to reality” Albert Einstein.
Designing Multi-level Interventions - Question for thought

2) What combination of interventions is most feasible and acceptable given social contextual settings that are characterized by complexity, nonlinearity and sensitivity?
Reduce the Divide Between the Have’s and the Have Not’s
Designing Multi-level Interventions - Question for thought

3) Which combination of interventions are likely to produce complementary or synergistic effects?
HIV Biomedical and Behavioral Interventions: Complementary approaches for optimizing HIV prevention
THANK YOU!!