So much risk, so little time:
Concurrent partnerships and a paradigm shift
in understanding and addressing the highest
prevalence HIV epidemics

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September 2006
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Brief agenda

• Action items
  – Strategic programming priorities for concentrated epidemics
  – Strategic programming priorities for generalized epidemics

• Anomalies in sub-Saharan Africa
  – How can the highest prevalence epidemics be fueled by “lower risk” behaviors?

• Anthropomorphy
  – Or, why the HIV virus loves concurrent partnerships

• Acute infection

• Risk perception and “horse-trading” in risk

• Concurrence – risky in and of itself

• Empirical observations

• Action items, redux
Concentrated vs. Generalized epidemics
(The majority of new infections come from different sources)

**Concentrated**: Most new infections can be attributed to higher-risk contexts (i.e.: MSM, IDU, CSW, etc…)

**Generalized**: Most new infections come from heterosexual contact in the general population
Multiple sexual partnerships

Worldwide, almost all studies show increased risks with increased sexual partners

Partner reduction has been associated with declines in HIV at the population level in both concentrated and generalized epidemic settings.
Programmatic good news / not-so-great news

A simplification:

Interventions → Behavior Change → Declines in HIV

We want to scale up these...to the extent that they effect this.......and in turn effect this......

Good news in concentrated epidemics:

Interventions → Behavior Change → Declines in HIV

We actually know quite a lot about “what works” in concentrated epidemics...the challenge is going to scale with targeted programming to address the highest-risk populations and contexts.

Not-so-great news in generalized epidemics:

Interventions? → Behavior Change? → Declines in HIV

We’ve seen evidence of associations between population level changes in behavior and declines in HIV, but there still exist divergent perspectives on behavioral priorities, and we lack clarity about “what works” to address these.
Thinking about behavioral norms

The probable distribution of behavioral risk for HIV infection in a population

- Highest risk, fewest individuals
- Moderate risk, most individuals

Adapted from Rose G, The Strategy of Preventive Medicine, 1992
Key anomalies, and “revolutionary” remarks

Given the apparent low prevalence of the “highest-risk” behaviors in the highest prevalence epidemics, what are the behavioral norms that drive these epidemics?

- 20-30% adult HIV prevalence in the general population in some southern African countries?
- Yet, relatively low prevalence of IDU, MSM, and formal CSW?

“Mathematical models estimate the average probability of male–female transmission of HIV-1 per unprotected coital act to be between 0.0005 and 0.003% during chronic HIV infection, which in itself would not sustain an epidemic.”

-Pao et al, AIDS (2005)
A "virus-eye" view:

Why the HIV virus loves concurrent partnerships

1. More new exposure opportunities per unit time
   - HIV doesn’t like being trapped in a relationship
2. A higher proportion of exposure occurs during the period of highest transmission efficiency

Per-exposure infection risks associated with different types of activity

- Needle sharing
- Receptive Anal Sex
- Acute infection
- Chronic infection
- “Higher-risk” activity
- General heterosexual activity

Lighter colors reflect the range between low and high estimates.

References:
2. Hakim et al. (2001) AIDS. 15(S)
Acute infection

HIV transmission per coital act by stage of infection in discordant couples

Wawer et al JID 2005

Transmission per 1,000 coital acts

Incident infections

Latent infections

AIDS

Months after index partner seroconversion

Months of follow up during Latency

Months preceding death of index partner (AIDS)
Acute infection

Time since infection

Proportion of HIV transmission events in period

Acute infection at the population level

The next new infections in a population will often come from the individuals most recently infected.
“Risky” network paradigms and “horse-trading” in risk

“High degree”
- Some individuals are highly connected (core transmitters)
- Perceived as “high risk”
- Potentially more likely to motivate prevention behavior

“Low degree”
- Most individuals are less connected
- Perceived as “lower risk”
- Potentially less likely to motivate prevention behavior
Achieving consistent use in the general population has been a challenge…
Condoms can dramatically reduce HIV infection risk (by about 85%)...when they are used **correctly** and **consistently**

The relationship between different levels of condom use and acquisition risks for HIV and specific STIs

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*Adjusted for demographic and behavioral variables (incl. multiple partners)
Low degree networks create a transmission core

In largest component:
- 2%
- 10%
- 41%
- 64%

In largest bicomponent:
- 0
- 1%
- 5%
- 15%

Source: Martina Morris, Univ. of Washington, used with permission from a presentation given at a meeting on concurrent sexual partnerships and sexually transmitted infections at Princeton University, 6 May 2006.
“Map” of the largest component of a sexual network in Likoma, Malawi

Fig. 5: largest connected component. N = 685. It comprises more than 65% of the population of the 7 villages surveyed.

Lifetime number of sexual partners, selected countries, mid-1990s

**Uganda**
1994
*(Rakai Sexnet study)*
18% HIV+

**United States**
1994
*(NHSLS study)*
1% HIV+

**Thailand**
1993
*(BRAIDS study)*
2% HIV+
Concurrent partnerships

Acute infection may make the **timing** of sexual partnerships as important as the **number** of partnerships with respect to HIV transmission.
Concurrent partnerships by age and gender, Botswana

Females
- Ages 15 to 24: 17.5%
- Ages 25 to 49: 11.5%

Males
- Ages 15 to 24: 43.5%
- Ages 25 to 49: 23.8%

Source: Makgabaneng Radio Drama Evaluation, BOTUSA Project, Botswana
(household sampling, sub-national data from the seven most populated health districts)
South Africa: Proportion of 15-24 year-olds reporting more than one sexual partner, 2005

- 15-19 year-olds
- 20-24 year-olds

An example of qualitative data from Botswana:

*Interviewer:*
Ok, a recent study asked people of Botswana how many different sexual partners they had during a one-year period. Seventy percent of these people said that they had only one partner during the past year.

*Participant:*
[Laughs] I don't believe that it's true.

*Interviewer:*
You don't believe it's true?

*Participant:*
You know that Batswana are too playful, they like drinking alcohol, and partying too much. When you go to nightclubs women use men to buy you beer or sponsor you for the night. After this they sleep together he becomes your boyfriend for that night. The next weekend you meet a different boyfriend and so on. Really there is no Motswana who is stable.

*Interviewer:*
Mm.

An example of qualitative data from Botswana:

Participant:
And there is no Motswana who knows what commitment is. I don't agree with that. Batswana sleep with different partners.

Interviewer:
Mm, why do you think people were not honest?

Participant:
Because today [Laughs] I don't know, I don't know, you know. Maybe they didn't research in =Mochudi= I doubt.

Interviewer:
Why do you say =Mochudi= aren't they honest.

Participant:
The thing is in these researches people don't usually tell the truth, one wouldn't tell you how many partners she sleeps with in a week or month or a year. You would find that one would have a boyfriend to pay for rent, one for clothing, one for gas, one for food and the other to take her out to nightclubs, you see. So I don't agree with that.

Predicting the spread of infectious diseases:

\[ R_0 = \beta D C \]

- \( R_0 \): Secondary spread of disease agent
- \( \beta \): Transmission efficiency
- \( D \): Duration of infectiousness
- \( C \): Number of individuals exposed

The “perfect storm” resulting in high-prevalence, generalized epidemics?

\[ R_0 = \beta Dc \]  
(Number exposed)

\[ R_0 = \beta Dc \]  
(Transmission efficiency)

Multiple / concurrent partnerships

Low prevalence of male circumcision (?)

Acute infection

HSV-2(???)
Using epidemiology to set strategic priorities

The probable distribution of behavioral risk for HIV infection in a population

Adapted from Rose G, The Strategy of Preventive Medicine, 1992
Programming to address concurrence

• Need an approach that leverages all available social capital to change risky behavioral norms
  – Media
  – CBOs
  – FBOs
  – Leaders

• May need to dramatically increase perceptions of risk associated with “normal” behaviors
  – Disinhibition?

• How explicitly should we be communicating about concurrence and/or acute infection?
  – Communication challenges
  – Ethical issues