Prevention effectiveness for behavioral interventions

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Measuring Progress

Type of Intervention	HIV Prevention Efficacy			Total
	Positive Effect	Adverse Effect	No Effect	
BEHAVIORAL	---	---	7	7
Microfinance	---	---	1	1
Diaphragm	---	---	1	1
Vaginal Microbicides	1	1	11	13
PrEP	---	---	1	1
Male circumcision	3	---	1	4
STI Treatment	1	---	8	9
Vaccines	1	---	3	4
Total	***6***	***1***	***33***	***40***

Source: Padian, McCoy, Balkus, & Wasserheit. *AIDS* 2010;24:621-35.

Lit review: Study eligibility and selection criteria

- Designs that compared post intervention outcomes with a plausible counterfactual using one of the following designs:
  - Pre-post w/ no comparison
  - Quasi-experimental design (non randomized, w/ control)
  - RCTs
- Must measure incident HIV
- Did not include: condom procurement or promotion as a stand-alone
- Databases searched: NLM Gateway, PubMed, EMBASE, PsychInfo, SocioAbstracts

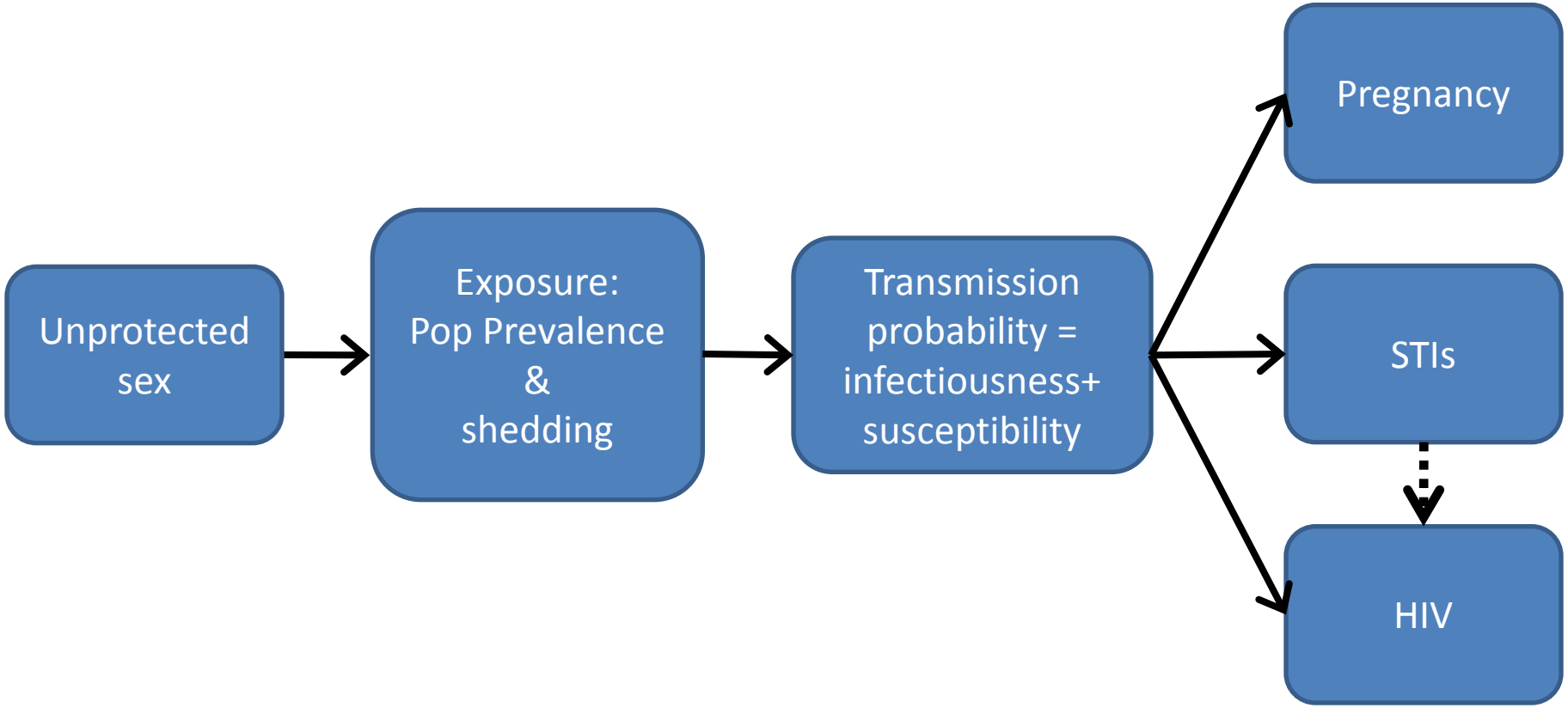
Justification for focus on impact (HIV infections averted)

Problems with high-risk behavior as a surrogate outcome

- Self-report is unreliable and inconsistently associated with HIV infection or other biological markers of unprotected sex
  - Recall bias
  - Social Desirability Bias
  - Unknown partner risk (↓ risk behavior w/ ↑ risk partners)
    - Problem of risky sex with low risk partners, low risk sex (protected) with risky partners
- No formula to translate high-risk behavior into infections averted & the effect is variable
- Necessary but not sufficient for transmission

Problems with biological outcomes as interchangeable surrogates:

Causal chains: “exposure” and “susceptibility” vary for each outcome



Important Evidence Caveats

- Literature reviews cursory: No grey literature or abstract reviews; not all databases searched
- Overlapping categorization of studies: e.g., almost no intervention was implemented alone
- Confusion between target population and type of intervention
- Heterogeneous measures of impact: no attempt to examine raw data to construct forest plots or comparable summary measures of effect
- Imprecise scoring/rating of strength of evidence (quality and impact)

Quality Score for rigorous design (1-5); one point each for:

- Comparison Arm
- Randomization
- Comparable Socio-Demographics in intervention and control*
- *Comparable distribution of outcome measures at baseline or adjustment ex-post*
- Follow-up >70%

- 5 indicates the most rigorous methods

- **HOWEVER**, collapsed into: poor (no studies >3; fair= at least one = 4; good= > than one 4 or at least one 5)

***For randomization: correct imbalances through analyses; for quasi-experimental designs, correct through matching or analyses**

Impact Score (4 pt scale)

- Large: unequivocally significant results
- Some: marginally significant results, smaller order of magnitude
- Potential: Not significant but in right direction
- None: none
- **However:** some and potential collapsed
- *Huge caveat: The distinction among efficacy, effectiveness, and pop level impact needs to be disentangled*

Complete matrix of interventions disentangling activities from risk groups

	CSW	MSM	IDU & other drug users	HIV+ women	Youth	Discordant Couples	General Population
Mass comm	van Griensven						Quigley
Peer Education	Luchters		Sherman Garfein		Doyle Ross		Basset
Counseling/ risk reduction	Patterson Riedner Bhave	Koblin		Saleh-Onoya Wingood		El Basel	
HTC						Allen	Sherr Matovu Corbett Matovu Machekano Allen
Combined/ Other Behavioral	Reza-Paul Laga Hannenburg				Cowan Jewkes		Gregson

Quality and Impact of Evidence by Activity and Target Population (# of studies)

	CSW	MSM	IDU & NIDUs	HIV+ women	Youth	Discordant Couples	Gen. Population
Mass Comm	(1): Poor None						(1): Poor Some
Peer Education	(1): Poor None		(3): Good None		(2): Good None		(1): Good Some
Counseling / risk reduction	(3): Fair Large	(1): Poor None		(3): Good Large		(1): Good None	
HTC						(1): Poor Some	(6): Poor Potential
Combined / Other Behavioral	(4): Poor Potential				(2): Good None		(1): Poor None

Impact Irrespective of Quality

(# of studies)

Green = Effective, Yellow = Some or Potential, Red =Ineffective

	CSW	MSM	IDU & NIDUs	HIV+ women	Youth	Discordant Couples	Gen. Population
Mass Comm	(1) Poor None						(1) Poor Some
Peer Education	(1) Poor None		(3) Good None		(2) Good None		(1) Good Some
Counseling / risk reduction	(3) Fair Large	(1) Poor None		(3) Good Large		(1) Good None	
HTC						(1) Poor Some	(6) Poor Potential
Combined / Other Behavioral	(4) Poor Potential				(2) Good None		(1) Poor None

Impact based on Good Quality

(# studies)

Green = Effective, **Yellow** = Some or Potential, **Red** = Ineffective

	CSW	MSM	IDU & NIDUs	HIV+ women	Youth	Discordant Couples	Gen. Population
Mass Comm	(1) Poor None						(1) Poor Some
Peer Education	(1)Poor None		(3) Good None		(2) Good None		(1) Good Some
Counseling / risk reduction	(3)Fair Large	(1) Poor None		(3) Good Large		(1) Good None	
HTC						(1) Poor Some	(6) Poor Potential
Combined / Other Behavioral	(4) Poor Potential				(2) Good None		(1) Poor None

Priorities for Impact Evaluation

Green = Highest Priority, Yellow = Medium Priority, Red = Lowest Priority, Blue=??, blank cells?

	CSW	MSM	IDU & NIDUs	HIV+ women	Youth	Discordant Couples	Gen. Population
Mass Comm	Poor None						Poor Some
Peer Education	Poor None		Good None		Good None		Good Some
Counseling / risk reduction	Fair Large	Poor None		Good Large		Good None	
HTC						Poor Some	Poor Potential
Combined / Other Behavioral	Poor Potential				Good None		Poor None

What Works??

- We know that behavioral unequivocally drives transmission
- We know less about how to change it
  - We know even less about population-level impact
  - Could have synergistic or amplifying effects in combination prevention
  - What to do about blank cells?
- Importance of behavior extends beyond specific behavioral interventions
  - A part of ***all*** other interventions including those that are biomedical
  - Shapes the context for all prevention programs

Way Forward

- Evidence for modest levels of impact requires precision
  - Definition/documentation of the intervention
    - Even more challenging for combination prevention
  - Require rigorous evaluations with
    - Clear measures of infections averted
    - Clear counterfactual that permits attribution
- Limited confidence regarding what does and doesn't work should not translate into doing more of the same
  - Consider abandoning what unequivocally does not work ***and*** what has uncertain impact, but which cannot be evaluated
- Consider innovative methods of behavior change (e.g. increase demand through incentives or marketing)
- *No more meetings about what works for prevention*

Tables summarizing strength of evidence by intervention type

Mass Communication

Study	Year	Location (N)	Design	Risk Group	Measure of Effect*	Quality (1-5)
Quigley	2007	Uganda (3,394)	C-RCT	HIV-adults	Attendance at any activity: Men: IRR=0.66 (0.25, 1.79) Women: IRR=0.41 (0.19, 0.89)	3
van Griensven	1998	Thailand (751)	Serial X-sec	CSWs	HIV incidence: Sungai Kolok (intervention): 4.3 per 100py, Betong, (control): 4.2 per 100 py (p>0.05)	1

Peer Education

Study	Year	Location (N)	Design	Risk Group	Measure of Effect*	Quality (1-5)
Doyle (note: long term follow up to Ross 2007)	2010	Tanzania (13,814)	X-sec	Youth	HIV prevalence: PR_a=1.07 (0.68, 1.67)	3
Sherman	2009	Thailand (983)	RCT	Meth users	↑GC, no effect CT, HSV-2, HIV, HCV	4
Luchters	2008	Kenya (503)	Serial X-sec	CSWs	No effect HIV prevalence (p=0.36)	1

Peer Education

Study	Year	Location (N)	Design	Risk Group	Measure of Effect*	Quality (1-5)
Ross	2007	Tanzania (965)	C-RCT	Youth	PR_a=0.75 (95%CI: 0.34, 1.66)	5
Bassett	1998	Zimbabwe (2,000)	Cohort	Male factory workers	HIV incidence among workers in the peer education was 34% lower than workers in the control (p=0.04)	4
Garfein	2007	USA (854)	RCT	IDUs	No HIV seroconversions; HCV: RR= 1.15 (0.72-1.82)	4

HTC

Study	Year	Location (N)	Design	Risk Group	Measure of Effect*	Quality (1-5)
Sherr	2007	Zimbabwe (5775)	Cohort	Gen pop	No difference in incidence between those who were: tested and received results, no results, & not tested	1
Matovu	2007	Uganda (6337)	Cohort	Gen pop	Repeat acceptors vs. Non acceptors: (incidence) IRR = 0.85 (0.58, 1.23)	1
Corbett	2007	Zimbabwe (2966)	C-RCT	Factory workers	Intensive vs. Standard VCT (incidence): RR_a=1.49 (0.79, 2.80)	3
Matovu	2005	Uganda (10694)	Cohort	Gen pop	No diff in HIV incidence VCT acceptors vs non-acceptors (P = 0.6)	1

HTC

Study	Year	Location (N)	Design	Risk Group	Measure of Effect*	Quality (1-5)
Machekano	1998	Zimbabwe (2414)	Cohort	Factory workers	The likelihood of serocoverting was lower after obtaining results than before: IRR=0.63 (0.31, 1.30)	1
Allen	1992	Rwanda (53 couples)	Cohort	Disc couples	HIV incidence in discordant couples tested together lower than in DC where the women tested alone	3
Allen	1992	Rwanda (1458)	Cohort	HIV-women	Decrease in HIV incidence among women whose partners had been tested (4.1 per 100 pys to 1.8 per 100 pys, p=0.04).	1

Counseling/risk reduction

Study	Year	Location (N)	Design	Risk Group	Measure of Effect*	Quality (1-5)
Saleh-Onoya	2009	South Africa (120)	RCT	HIV+ W	TV, GC, and CT all significantly reduced	4
Patterson	2008	Mexico (924)	RCT	CSW	HIV lower in intervention (p=.004)	4
Riedner	2006	Tanzania (966)	Cohort	CSW	HIV incidence: OR=0.63 (p=0.03)	1
Koblin	2004	USA (4,295)	I-RCT / One-to-one counseling	HIV-MSM	Incident HIV: AOR 0.84 (0.66, 1.08)	5

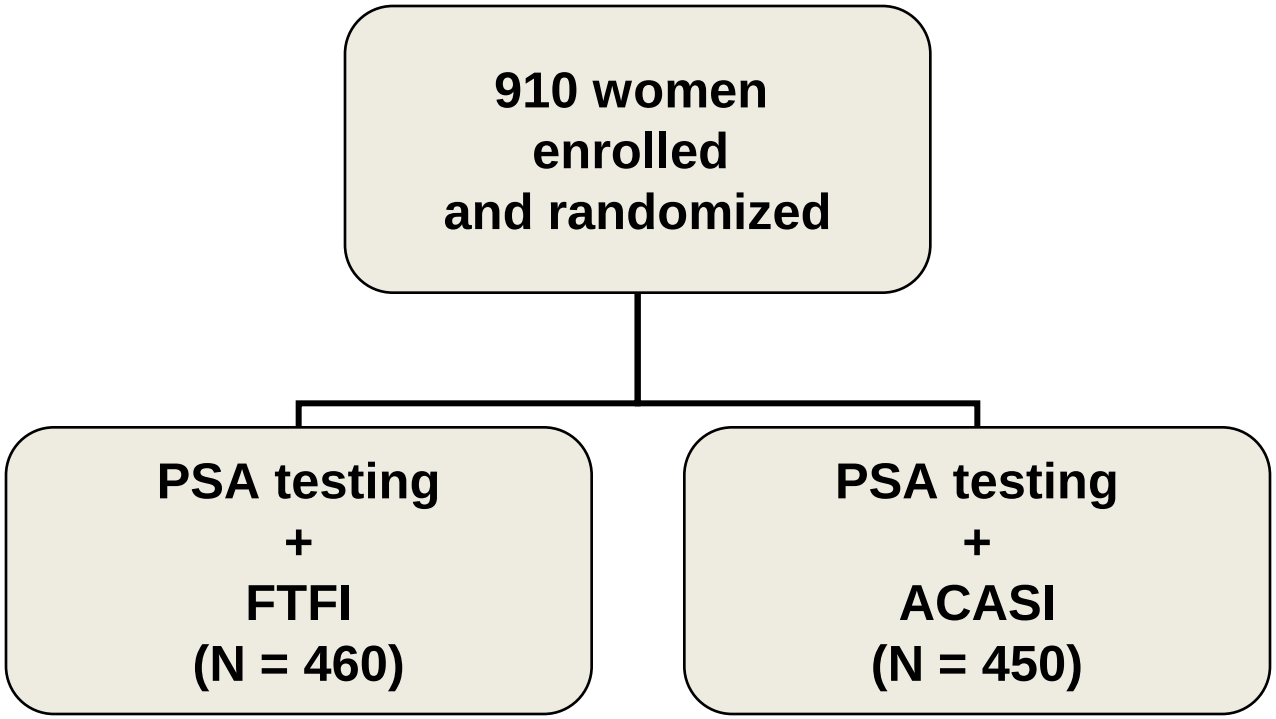
Counseling/Risk Reduction

Study	Year	Location (N)	Design	Risk Group	Measure of Effect*	Quality (1-5)
Wingood	2004	USA (366)	RCT	HIV+ W	Any bacterial STI: OR=.2, (p=.006)	5
Bhave	1995	India (541)	Cluster non-randomized	CSWs	RR=.32 (p=.002)	4
El-Bassel	2010	US (535)	C-RCT (Behavioral)	Discordant couples	Seroconversions: Couples: 2 out of 260, Control: 3 out of 275	5

Other/comb behavioral interventions

Study	Year	Location (N)	Design / Intervention	Risk Group	Measure of Effect*	Quality (1-5)
Cowan	2010	Zimbabwe (4,684)	C-RCT / Professional peer ed.	Youth	OR=1.15 (.81-1.64)	3
Reza-Paul	2008	India (429)	Serial X-sec	CSWs	HIV stable pre versus post	0
Jewkes	2008	S. Africa (2,776)	C-RCT	Youth	HIV: IRR_a=0.95 (0.67, 1.35) HSV: IRR_a=0.67 (0.47, 0.97)	5
Gregson	2007	Zimbabwe (9,454)	C-RCT	Gen pop	HIV: IRR= 1.27 (0.92–1.75)	2
Laga	1994	Zaire (531)	Cohort	multi-component	HIV prev11/7 100py pre vs 4.4 /100py post: p=.0003	0
Hannenburg	1994	Thailand (country-wide)	Time series, Ecologic	Male Clients of CSWs	HIV prevalence among CSWs increased from 1989 (6.3%) to 1993 (29.5%)	1

ACASI vs. Face-to-face interview



- 196 participants (21.5%) had biological evidence of recent semen exposure (i.e. tested positive for PSA)
  - 104 participants in ACASI arm
  - 92 participants in FTFI arm

Discordant PSA results and self-reported behaviors

Reported activity past 2 days	Total (N=196)	
	No.	%
No sex	23	11.7
Only condom-protected sex	71	36.2
Total	94	48.0