

## BACKGROUND

### HPTN 065 STUDY

HIV viral suppression is associated with individual and societal health and economic benefits. The HPTN 065 study assessed the effectiveness of financial incentives on viral suppression (VS) among patients in care and on antiretroviral therapy at HIV care sites in the Bronx, NY and Washington, DC (Figure 1). The overall proportion of patients virally suppressed was higher at FI compared to standard of care sites.

### OBJECTIVE

Construct and utilize an economic model, based on clinical trial data, to evaluate the cost-effectiveness of financial incentives for viral suppression in HIV patients compared to standard HIV care.



FIGURE 1. Sites (n = 39) were randomized to deliver FI or standard HIV care for two years

## INPUTS

We combined data from HPTN 065 with health care costs and quality of life adjustments identified in peer-reviewed literature (Table 1). Intervention costing was based on quarterly clinic-level data and study budgets. Patient HIV health care costs were based on a study by Gebo et al., 2010. Self-reported sexual activity from a subset of HPTN 065 participants informed the transmission risk equations (Figure 3).

TABLE 1. Key model inputs	Value (Range)	Source
Clinic size, average number of patients per quarter	456 (43-2262)	HPTN 065
FI distributed quarterly, clinic average	286 (21-1331)	HPTN 065
<b>Costs</b>		
Financial Incentives Coordinator, per clinic per year	\$46,875	HPTN 065
Equipment: laptop and printer in year 1, per clinic	\$1,500	HPTN 065
Office supplies, per clinic per year	\$150	HPTN 065
Financial incentive gift card value, each	\$70	HPTN 065
<b>Outcomes</b>		
Change from baseline clinic proportion VS, average percentage points increase	3.7% (0.5 – 6.9%)	HPTN 065
Increase in outpatient visits with incentives, %	8.7% (4.2-13.2%)	HPTN 065
Utility, CD4 >500	0.73 (0.63-0.83)	Whitham 2016
Utility, CD4 350-500	0.71 (0.59-0.82)	Whitham 2016
Utility, CD4 <350	0.69 (0.58-0.80)	Whitham 2016
Discount rate for costs and outcomes, %	3% (0-5%)	Neumann 2016

## RESULTS

### CLINICAL OUTCOMES

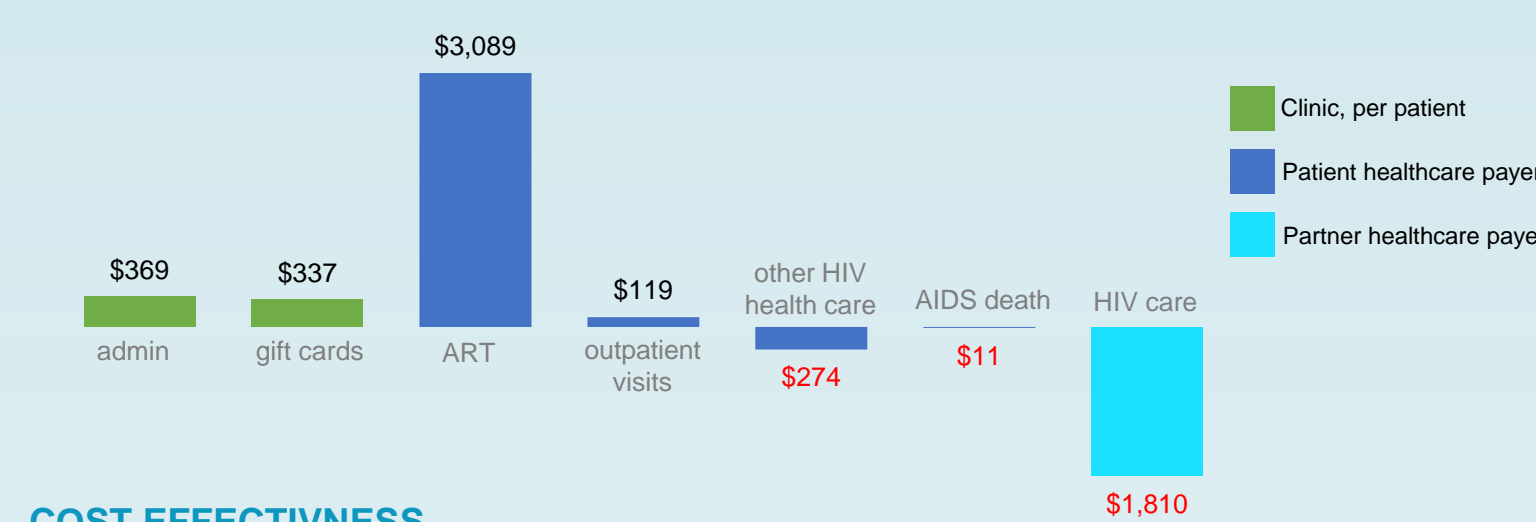
Financial incentives improved clinic VS and we estimate compared to standard care:

- Gain an average patient 0.04 lifetime QALYs (ranging 0.03-0.07 across sub-groups)
- Reduce HIV transmissions by 5.6% (ranging 1.2-14.2% across sub-groups)

### COSTS

Over two years, administration cost \$167,714 per clinic and gift card incentives (Figure 8) cost an average \$337 per patient. Figure 5 shows the lifetime difference in health care sector costs per patient receiving financial incentives versus standard care.

Figure 5. Marginal costs per patient



### COST-EFFECTIVENESS

Financial incentives for VS were **highly cost-effective** compared to standard HIV care (Table 3 and Figure 7). By avoiding several HIV infections, partners of patients receiving financial incentives had substantially lower total health care costs.

TABLE 3. Summary of costs and benefits

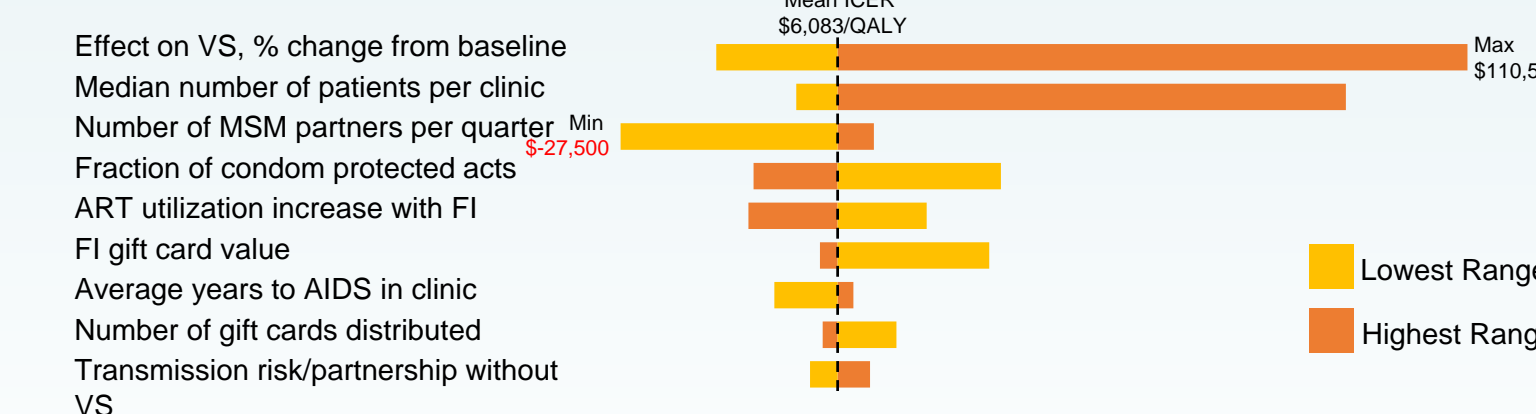
	Total Costs <sup>a</sup> , per			Total QALYs, per		HIV Infections	ICER (\$/QALY)
	Clinic <sup>a</sup>	Patient	Partner	Patient	Partner		
Standard of Care	-	\$357,674	\$51,066	9.25	16.75	134	
Financial Incentives	\$321,183	\$360,597	\$49,256	9.29	16.77	126	<b>\$6,083</b>
Incremental	\$321,183	\$2,923	-\$1,810	0.04	0.03	- 8	

<sup>a</sup>For an average clinic cohort of 455 patients and 773 partners, the totals are provided per clinic, per patient, and per partner.  
<sup>b</sup>Lifetime HIV-related health care costs presented in 2015 US\$ and discounted 3% annually.

### SENSITIVITY ANALYSES

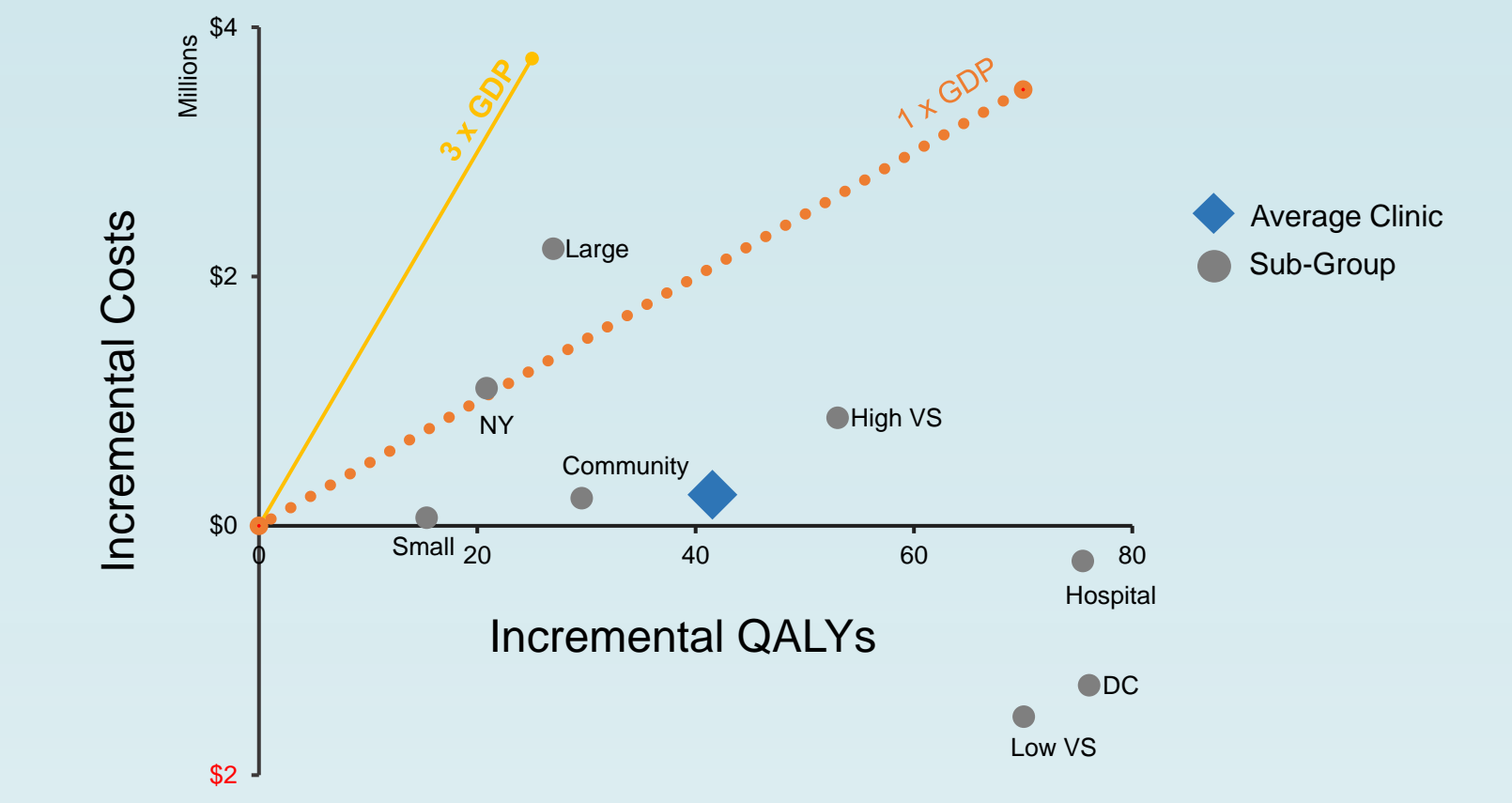
Intervention effectiveness and clinic size were important drivers of cost-effectiveness (Figure 6).

FIGURE 6. Impact of parameter uncertainty on cost-effectiveness estimate



Financial incentives for VS had the greatest value in clinics with low baseline VS and were least cost-effective in large clinics (Figure 7). All clinic sub-groups fell within the \$150,000/QALY threshold for cost-effectiveness (Table 2).

FIGURE 7. Cost-effectiveness by sub-group of clinics



Total costs (adjusted to 2015 USD) include the financial incentives program for HIV patients and the lifetime HIV-related healthcare expenditures. Costs and QALYs 3% discount rate, lifetime horizon, and health care sector perspective. FI, financial incentives; VS, viral suppression; QALYs, quality adjusted life years; ICER, incremental cost-effectiveness ratio.

## MODEL

### PROJECTING LONG-TERM PATIENT OUTCOMES

To project long-term clinical benefits and HIV-related health care costs, we developed a cohort model of HPTN 065 study participants and their partners (Figure 2). Patients progressed through HIV health states and risked transmission to partners (Figure 3). Total costs and quality-adjusted life years (QALYs) were estimated from a health sector perspective using a lifetime horizon and 3% annual discount rate.

FIGURE 2. Conceptual diagram of patient cohort modeled over lifetime horizon

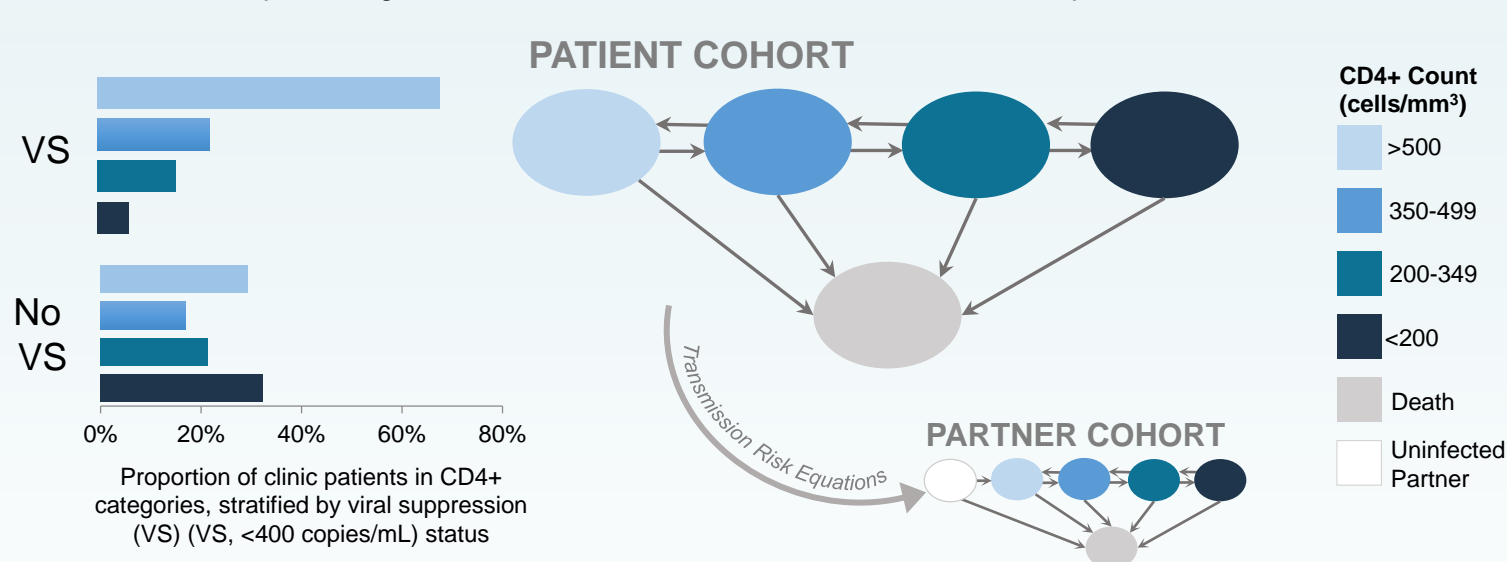


**KEY ASSUMPTION:** We assume that when incentives end after two years the effect on viral suppression diminishes to zero over six months.

$$\text{INCREMENTAL COST-EFFECTIVENESS RATIO (ICER)} = \frac{\text{Costs}_{FI} - \text{Costs}_{STANDARD CARE}}{\text{QALYs}_{FI} - \text{QALYs}_{STANDARD CARE}}$$

Table 2. Threshold for Cost-Effectiveness	Willingness To Pay	Threshold
Assumed Lower Range	1 x GDP per capita	\$50,000 per QALY
Assumed Upper Range	3 x GDP per capita	\$150,000 per QALY

FIGURE 3. Conceptual diagram of Markov model and HIV transmission risk equations



## DISCUSSION

- Financial incentives as used in HPTN 065 for viral suppression offer **substantial value for the money spent** and provide an opportunity to improve the length and quality of life for HIV patients and their partners compared to standard HIV care.
- This economic evaluation provides evidence supporting the likely cost-effectiveness of this intervention to strengthen the clinical care continuum and reduce HIV transmission.
- Further work is needed to assess the effectiveness and cost-effectiveness of such an intervention in low and middle-income countries with severe HIV epidemics.

### ACKNOWLEDGEMENTS

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FIGURE 8. Gift card distributed in HPTN 065