

**Financial incentives to improve progression through  
the HIV treatment cascade**

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## **Abstract**

### **Purpose of review**

We reviewed recent literature on conditional and unconditional financial incentives for their impact on improving movement through the HIV care cascade and HIV prevention.

### **Recent findings**

Concepts from behavioral economics may help improve engagement in HIV care by addressing upstream structural risk factors for HIV, such as poverty, or by providing conditional rewards for immediate, measurable outcomes related to HIV care. Incentives have been shown to increase uptake of HIV testing. Yet, few studies to date focus on linkage to care: one large US-based randomized trial failed to show an effect of incentives; a smaller trial showed improved linkage to care among drug users, but no difference in virologic suppression. Several small US-based studies have shown an impact of financial incentives on antiretroviral therapy adherence, but without durability beyond the incentive period. HIV prevention has the most robust evidence for decreasing HIV risk-taking behavior among adolescents and may serve as a model for research on the care cascade.

### **Summary**

Financial incentives show promise for improving engagement in HIV testing, care, and prevention. Understanding the durability, scalability, ease of implementation, and cost-effectiveness of these different approaches will be critical for maximizing the impact of incentives in curtailing the HIV epidemic.

**Keywords:** financial incentives, HIV care cascade, HIV prevention

## Introduction

Widespread uptake of potent antiretroviral therapy (ART) holds the promise of reducing HIV morbidity and transmission, but it requires consistent engagement with the health care system. Though the success of efforts to identify HIV-infected individuals and retain them in care is remarkable – 12.9 million people were receiving ART worldwide at the end of 2013 and AIDS-related deaths have fallen by 35% since 2005, efforts continue to fall short of the growing epidemic. It is estimated that 2.1 million people were newly infected with HIV in 2013, and that of the 35 million people living with HIV in the world, 22 million are not accessing treatment [1].

There has been increasing focus on the importance of maintaining people living with HIV (PLHIV) in the HIV treatment and care cascade, highlighted by the recent establishment of UNAIDS 90-90-90 Fast Track targets (90% of PLHIV knowing their HIV status, 90% of those knowing their HIV status on treatment, and 90% of those on HIV treatment virally suppressed)[2]. Within the HIV care cascade, there are several stages at which to engage patients and HIV care providers: HIV testing and diagnosis, linkage to HIV care, retention in HIV care, ART prescription, and achieving virologic suppression. For the purposes of our review, we have grouped linkage to and retention in care together, as well as grouping prescription of and adherence to ART with virologic suppression.

Successful maintenance of patients through the cascade varies. While 86% of PLHIV in the United States are diagnosed, only 40% of PLHIV are engaged in care, 37% prescribed ART, and 30% virally suppressed [3]. In Rwanda, it is estimated that 63% of PLHIV are on ART and 52% virally suppressed [4], higher than the prevalence of virologic suppression in the US and in British Columbia [5]. Substantial improvement is needed along the cascade to reach the UNAIDS Fast Track goals.

Increasingly, attention has turned to the field of behavioral economics to help improve patient engagement in HIV care and prevention by augmenting more traditional behavioral interventions. While

the bulk of previous work, and therefore reviews of this topic, have focused on financial incentives for HIV prevention [6-9], emerging data relate to financial incentives as a means of promoting HIV testing, linkage to care, and adherence to treatment. Financial incentives may be used to: 1) explicitly address structural risk factors for HIV, such as payments to relieve poverty or increase education; these programs pay households for a child that attends school, or 2) provide conditional rewards for immediate, measureable outcomes related to HIV, such as cash for attending a first clinic visit after HIV diagnosis; these are more akin to contingency management [9].

In this review, we focus on both conditional and unconditional financial incentives that have been assessed for their impact on the HIV care cascade through randomized controlled trials, observational studies, or government social protection programs. We provide a brief background on the rationale for using financial incentives to improve health outcomes, review recent (assessed through a PubMed search of terms such as “HIV incentive”, “HIV cash”, and “HIV cash transfer”) and ongoing studies (assessed through clinicaltrials.gov) using incentives for steps in the HIV care cascade, and outline key considerations for future work.

### **Rationale for financial incentives in HIV care cascade**

Behavioral economics integrates psychological and economic principles to understand individual decision making [8]. In contrast to traditional microeconomic theory, behavioral economics recognizes that decisions are not consistently rational, and are strongly influenced by contextual factors, beliefs, competing demands, emotion and other social-cognitive factors [8]. Specifically, individuals often make a ‘rational’ choice to pursue unhealthy behaviors over healthy behaviors, which are often associated with a delay and uncertainty in anticipated health gains (i.e. reduced disease risk in the future,) and immediate and certain financial and opportunity costs (i.e. giving up leisure time to attend clinic visits)

[10]. Within this context of rewards based on time and certainty, it is hypothesized that health promoting financial incentives would be attractive to individuals and influence health decision making, as they provide certain and near-immediate reward for health promoting behaviors. Incentives can also potentially increase use of health services by offsetting real costs that may come from seeking healthcare, such as those of travel or missed work. [11]. Effective financial incentives employ basic principles of behavior reinforcement, including identification of target behavior, frequent collection of an objective measure of that behavior, selection of desirable reinforcement, and consistent and immediate link between target behavior and reinforcers [12]. Conditional incentive-based approaches have been used successfully in multiple settings to promote healthy behaviors, including smoking cessation, weight loss, adherence to childhood vaccination, and antenatal clinic visits [13-17].

These concepts can easily be applied to the HIV care cascade. For example, people may not adhere to antiretroviral therapy (ART) because they perceive a reduction in utility due to out-of-pocket costs, side effects, and delayed benefits. While they may know that poor adherence can lead to treatment failure, opportunistic infections, and HIV transmission, these events may occur far into the future. People prescribed ART may discount the future and prefer the current utility of not adhering over future benefits of controlled viral load. Hence, conditional incentives help bring forward in time the benefits of treatment, for example increasing income when adherent to ART and making specific costs (i.e. losing incentives) more salient [6, 18].

### **HIV testing**

HIV testing and diagnosis is the first stage in the HIV treatment and care cascade in which financial incentives can be used to increase uptake of services. To date, five studies have investigated how financial incentives can be used in this context (Table 1).

The earliest published work on using incentives in the HIV care cascade focused on HIV testing. This single US-based study targeted and prospectively enrolled emergency department patients in Los Angeles deemed at high risk for HIV based on CDC criteria [19]. All participants during the 18-month study were referred for on-site HIV counseling and testing, but only those during the second six-month period received \$25 for completing HIV counseling and testing within one week. During the control periods, 20 (8%) of 252 subjects reached the study outcome, completion of HIV counseling and testing, compared to 27 (23%) of 120 participants that were financially incentivized during the intervention period (OR 3.4, 95% CI 1.8 – 6.3).

Other studies incentivizing HIV testing were carried out at non-clinical sites in sub-Saharan Africa. Thornton performed a randomized trial in which nearly 3,000 participants in rural Malawi were offered free door-to-door HIV testing and randomly assigned vouchers of \$0-3, redeemable upon obtaining their test results at a nearby voluntary counseling and testing center [20]. The demand for test results among those who received no incentive was 34%; those who received a voucher of any value were twice as likely to go to the center to retrieve their results compared to individuals receiving no incentive, controlling for distance. Furthermore, there was a positive linear effect on outcome with the level of incentive; each extra dollar increased collection of test results by 9%. Of note, the number of \$0 incentives distributed was less than that anticipated by chance, which speaks to the difficulty of delivering incentives equitably in the field.

Two Cape Town-based studies targeted incentivized testing to high-risk groups with traditionally lower HIV testing uptake: men and adolescents. Nglazi *et al.* performed a retrospective analysis among over 9,000 men accessing incentivized and non-incentivized mobile rapid HIV testing services compared to clinic-based testing services in underserved periurban areas of Cape Town, South Africa [21].

Participants who underwent incentivized testing received a food voucher worth \$10 redeemable at local

supermarkets. A higher HIV prevalence was observed among men accessing incentivized mobile testing (17%) compared with non-incentivized mobile (6%) and clinic based (10%) testing. Among mobile testers, a greater proportion of incentivized men reported being first-time testers (60% vs. 42%, **p<0.001**) and had advanced disease (15% vs. 8% had CD4 <200 cells/ $\mu$ l, **p = 0.027**) compared with non-incentivized testers. The same research group performed an observational study among adolescents offering incentivized testing as part of participation in multi-dimensional youth centre activities compared to uptake of testing at a local clinic in the adjacent community. Among youth aged 12–15 years, 12.7% more individuals tested at the youth centre compared to the clinic [22]. A recent systematic review evaluating the effects of incentives on HIV and sexually transmitted infection testing uptake (7 studies of monetary or non-monetary rewards, including 3 studies described above [19-21]) all demonstrated higher uptake in the incentivized groups; the greatest effect was at non clinic-based testing sites [23].

### **Linkage to care**

Fewer studies have investigated how financial incentives can promote linkage to and retention in HIV care, though this is an active area of current research. The two studies which have been published related to the use of incentives for linkage to care encompass behaviors from initial HIV clinic visit through virologic suppression (Table 1).

The first study offered incentives for linkage to and retention in care and focused on HIV-infected drug users in Chennai, India [24]. One hundred twenty ART-naïve and eligible individuals with recent injection drug use from the YR Gaitonde Centre for Substance Abuse Research were referred to government facilities for ART and randomized to incentive or control arms. Participants in the incentive arm could earn up to 15 vouchers, redeemable for groceries or household items, upon achieving pre-specified

targets over 12 months: 1 for initiating ART (\$4 voucher value, the approximate average daily wage in Chennai), 12 for attending monthly clinical/medication refill visits (\$4 voucher each), and 2 for achieving virologic suppression (\$4 voucher each). Control participants were not offered incentives for treatment targets, but could win vouchers in prize bowl drawings.

Incentivized participants were more likely than control participants to link to care at government clinics (82% vs. 55%), have more monthly follow up visits (8, IQR 3-11 vs. 3.5 IQR 0-9) and initiate ART earlier. No differences, however, were observed between study arms in CD4 count gain or rates of virologic suppression. The authors speculate that immediate incentives may be more effective than delayed ones, and virologic suppression as an outcome may have been too remote from the daily adherence required to meet that outcome.

El-Sadr et al. recently presented results from the “Enhanced Test, Link to Care, Plus Treat Approach” (HPTN 065) study, which evaluated the effect of financial incentives on linkage to HIV care and viral load suppression among over 1,300 HIV-infected individuals in the Bronx borough of New York City and Washington, DC [25]. Thirty-four HIV test sites and 37 care sites were randomized to incentives versus standard of care. Incentive sites offered coupons incentivizing linkage to care to all people who tested positive for HIV, such as gift cards redeemable at HIV care sites (\$25 value for blood draws, \$100 value for test results/clinic visit); the other testing sites did not offer coupons. During the 2-year intervention, over 1,000 coupons were given to individuals who tested positive for HIV at the 19 sites offering coupons and 79% of the coupons were redeemed. Though the proportion of individuals who linked to HIV care within 3 months of a positive HIV test increased over time for almost all testing sites, the study found no significant improvement comparing testing sites that offered coupons to those that did not.

The researchers also evaluated the impact of offering a \$70 gift card for undetectable viral load, redeemable every 3 months, and they distributed nearly 40,000 cards to 9,153 participants at the sites



offering incentives. Though the proportion of patients with undetectable viral load increased at most sites over time, there was no significant increase in the proportion suppressed comparing incentive to usual care sites. A modest effect of the intervention was seen at hospital-based clinics, and at the **poorest** performing clinics (<65% suppression at baseline).

Two ongoing studies are investigating financially incentivizing linkage to care in sub-Saharan Africa (Table 2). Each focuses on providing a bundle of services in addition to incentives, with ENGAGE4HEALTH in Mozambique evaluating the value of an incentive added to a combination intervention.

### **Adherence and Virologic Suppression**

Various methods to incentivize ART adherence have been studied, including voucher reinforcements, prize systems, and cash payments [18]. Galarraga [18] reviewed 4 randomized trials of conditional economic incentives for ART adherence [26-29] (Table 1). All measured adherence by Medication Event Monitoring System (MEMS) pill bottles and offered cash or voucher incentives for correct doses taken. One study specifically enrolled patients experiencing treatment failure and financially rewarded them for decreased or undetectable HIV viral load [26]. The maximum potential earnings ranged from \$240 to over \$1,000 depending on the trial, with three using escalating rewards for achieving the target behavior on a sustained basis. All of these studies showed significant increases, in adherence, some as much as 30%, in the incentive groups compared to controls.

A recent (2013) pilot study by Farber *et al.* enrolled men from a Veterans Administration clinic to evaluate the feasibility and preliminary efficacy of a \$100 incentive for virologic suppression or a reduction in viral load. Each individual served as his own control, comparing the intervention year with the previous year using routine clinic quarterly viral load checks. While there was no change in

proportion of individuals with undetectable viral loads (76% before to 77% after the intervention), among those with prior detectable viral loads, there was an improvement in the proportion with undetectable viral loads, from 57% before to 69% (**p = 0.03**) after the intervention [12].

These studies of incentivized ART adherence have all been small, and notably, the three studies that measured adherence outcomes after cessation of the incentive intervention [27-29] found that the benefits faded as early as 8 weeks later. This speaks to the difficulty of maintaining durable results for a complex behavior that requires long-term maintenance. Furthermore, these published studies have largely been carried out among US-based men, many with concurrent substance use. Fortunately, this aspect of the HIV care cascade has the greatest number of ongoing studies, including several in resource-limited settings, which should expand the knowledge base in this important area (Table 2).

## **Prevention**

Financial incentives have also been used with success outside of the HIV treatment and care cascade, and the use of cash payments to reduce HIV risk, either by addressing structural and social vulnerabilities such as poverty or by directly incentivizing behavior change, has emerged as a novel HIV prevention tool. Over 1 billion people worldwide receive cash payments as part of social protection [9]. These payments may be unconditional, such as payments to households with children which earn less than a means-tested benchmark in South Africa [30] or conditional on certain behaviors such as school or preventive care attendance for impoverished households in the Oportunidades program in Mexico [31]. In addition to improving socioeconomic status, these cash payments are believed to reduce sexual risk taking in several ways, including improving individuals' outlook for the future and increasing preferences for healthier behaviors and activities with delayed returns such as schooling [6, 8]. Cash may also address the causal path linking poverty to HIV infection by mitigating the need for

transactional sex and sex with older partners and allow individuals to give more weight to long-term consequences of risk behaviors [32].

Recent studies from South Africa and Kenya highlight the impact of government-administered cash transfer programs for households with children on sexual risk behavior (Table 1). Cluver and colleagues performed a prospective observational study of participants aged 10-17 randomly selected from census areas in two urban and two rural health districts in South Africa [30] and found that receipt of a household cash transfer was associated with reduced incidence of transactional sex: in households with no grant, 5.5% of girls had transactional sex during the year, compared to 2.5% in grant households. A similar association was noted for reduced incidence of age-disparate sex for girls (4.3% among girls in households without grants compared to 1.2% in recipient households) [30]. In Kenya, Handa and colleagues found that during the initial roll-out of a Kenyan national social protection program, the random allocation of \$20 monthly to poor households with at least one orphan or vulnerable child reduced the relative odds of sexual debut among young people age 15-25 by 31%, with a larger impact among females (42%) than males (26%) [33]. Taken together, the Cluver and Handa studies support the association between government-administered unconditional household-level cash transfers and risk reduction, particularly for adolescent girls.

Three recent randomized trials with biomarker endpoints provide compelling evidence that conditional cash transfers can reduce sexually transmitted infections and HIV infection. De Walque *et al.* compared the impact of low (\$10 every 4 months) and high value (\$20 every 4 months) conditional cash transfers in young adults (age 18-30) in Tanzania on the prevalence of sexually transmitted infections. At the end of 12 months, high-value participants had 27% lower sexually transmitted infection prevalence (aRR 0.73 95% CI 0.47-0.99) compared to controls; there was no significant difference between low-value participants and controls [34]. In Malawi, Baird and colleagues used unconditional and conditional cash

transfers (between \$1-5 monthly given to students and \$4-10 given to parents), contingent upon school attendance, to reduce HIV risk among school girls (age 13-22) [35]. The financial incentive groups had 60% lower HIV prevalence (aOR 0.36 95% CI 0.14-0.91) and were more likely to stay in school.

Finally, the most recent published study to use incentives for safer sex behavior had the most robust primary outcome, HIV incidence, and potentially targeted the most at risk individuals using behavioral economics. Nyquist and colleagues randomly assigned over 3,000 young adults (age 18-32) in Lesotho to the control or one of two intervention arms eligible to receive a lottery ticket every four months, with a chance to win either \$50 or \$100 if they tested negative for two treatable STIs in the prior week [36]. This lottery-style incentive led to a 21.4% reduction in HIV incidence, or 3.4% lower HIV prevalence rate in intervention compared to controls after 2 years. Furthermore, risk-taking individuals (measured through a hypothetical risk aversion question) responded more forcefully to the lottery incentive. The authors note that by using a gamble for the incentive intervention: 1) lotteries are relatively more attractive to people willing to take monetary risks; these may be the same people with risky sexual behavior and 2) people often overestimate small probabilities and therefore prefer a small chance at a large reward over a small certain reward.

Because so few published prevention studies assess HIV incidence, the final results of the CAPRISA 007 and HPTN 068 trials are eagerly awaited to provide additional evidence on conditional cash incentives for HIV prevention (Table 2).

## **Conclusion**

Cash transfers are increasingly recognized for their potential to improve engagement in HIV care and promote safer sexual behavior. There is some evidence that incentives increase demand for HIV testing; this may be particularly useful for increasing uptake among hard-to-reach populations such as men and

adolescents. Conditional incentives for linkage to care is the newest and most active area of emerging research, but an area for which there is equivocal evidence of efficacy. Several small studies have shown efficacy for improved adherence during the active phase of incentives, but more work is needed to understand the potential for durability beyond the period of incentives and how incentives may be used with other techniques, such as social support, to improve internal motivation and habit formation. The most evidence to date is in the area of sexual risk reduction, where there is robust evidence of spillover effects for health from social protection programs targeting poverty and education.

More work is needed to assess the efficacy of different incentive approaches. Should incentives be conditional or unconditional? Is a lottery or receipt of a certain value more effective for different populations or particular aspects of the care cascade? Are people motivated more by cash or other rewards, such as food vouchers? **Should incentives be linked to measures of immediate behaviors (such as opening a pill bottle) or to measures of clinical outcomes (such as virologic suppression)?**

Understanding the efficacy, durability, scalability, and cost-effectiveness of these different approaches will help maximize the impact of incentives in curtailing the HIV epidemic.

## Key points

- Behavioral economics can help improve engagement in HIV care by explicitly addressing structural risk factors for HIV such as poverty, or by providing conditional rewards for immediate, measurable outcomes related to HIV care.
- Observational studies and one randomized study support the use of incentives for improving uptake of HIV testing and HIV test result receipt.
- Several small US-based studies have shown an impact of financial incentives on antiretroviral therapy adherence, but have not had durable results beyond the end of the incentive period.
- Promising examples for the HIV care cascade come from HIV prevention in adolescents and young adults, where both conditional incentives delivered through research studies and unconditional government-administered social protection grants have been shown to decrease high-risk sexual behavior.
- Understanding the efficacy, durability, scalability, and cost-effectiveness of different approaches to using incentives will be critical for maximizing their impact of in curtailing the HIV epidemic.

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**Conflicts of interest**

The authors have no conflicts of interest.

**Table 1:** Published studies on the use of incentives and the HIV care cascade

Reference	Location	Target population	Intervention	Primary Outcomes	Primary Outcome Results	Secondary Outcomes and Results
<b>HIV TESTING</b>						
Haukoos et al. The effect of financial incentives on adherence with outpatient human immunodeficiency virus testing referrals from the emergency department. Acad Emerg Med. 2005;12(7):617-21.	United States	HIV-uninfected adults in emergency department	\$25 to patients for completing HCT	- Proportion completing HCT	23% of incentive and 8% non-incentive patients completed HCT	- HIV status (no HIV-infected cases in either group)
Thornton RL. The demand for, and impact of, learning HIV status. Am Econ Rev. 2008;98(5):1829-63.	Malawi	HIV-uninfected adults seeking HCT	Random assignment of monetary incentives after HIV testing to learn results	- Proportion result pick up	-2x more likely to get result if had incentive	- Effect of status on condom purchases (no effect if found HIV-, 3x more likely to buy condoms if learned HIV+)
Nglazi et al. An incentivized HIV counseling and testing program targeting hard-to-reach unemployed men in Cape Town, South Africa. JAIDS. 2012;59(3):e28-34.	South Africa	HIV-uninfected adult men	Vouchers (10 USD) redeemable at local supermarkets for accessing HCT for unemployed men compared to no voucher for men accessing HCT on their own initiative.	- HIV testing at incentivized and non-incentivized sites - HIV status	- Yield of new HIV cases 3x higher in incentivized - Prevalence 18.5% incentive vs. 7% non-incentive	- CD4 <200/ $\mu$ l at diagnosis (14.9% incentive vs. 7.5% non-incentive) - Age of testers (same) - Proportion with WHO OI events (21.4% incentive vs. 16.6% non-incentive)
Black et al. Improving HIV testing amongst adolescents through an integrated Youth Centre rewards program: Insights from South Africa. Children and Youth Services Review. 2014;45:98-105.	South Africa	HIV-uninfected adolescents aged 12-22	Points awarded to individuals who attend educational programs at a youth center and who achieve certain objectives (i.e. getting an HIV test). Points can be redeemed	- HIV testing numbers at the youth center compared to community clinic	- Testing increase of 12.7% at youth center for 12-15 yr olds - Active incentive users	- Frequency of youth center program attendance (median 3 visits, 31% had 7 or more visits) - Frequency of use of incentive system



**Table 1:** Published studies on the use of incentives and the HIV care cascade (continued)

			for small vouchers or larger prizes.		4.3x more likely to test	(median 4 uses, 32.8% active incentive users)
<b>LINKAGE</b>						
Solomon et al. Voucher incentives to improve linkage to and retention in care among HIV-infected drug users in Chennai, India. Clin Infect Dis. 2014;59(4):589-95.	India	HIV-infected, ART-naïve adult drug users	Incentive arm receives vouchers for reaching linkage and ART milestones; control arm can win vouchers in prize bowl, but HIV care not incentivized	- Time to ART initiation	- 45% incentive started ART, 26.7% non-incentive - Incentive group started ART sooner	- Visits to ART center (median 8 visits incentive, 3.5 visits control) - Viral suppression (no difference)
El-Sadr et al. Effect of financial incentives on linkage to care and viral suppression: HPTN 065. [Abstract #19]. Presented at CROI, February 23-26, 2015, Seattle, WA, USA.	United States	HIV-uninfected adults seeking HCT; HIV-infected adults	\$125 coupon for patient testing positive redeemable if linked to care within 3 months; \$70 gift card per quarter for patients on ART with viral suppression	- CD4 or VL within 3 months of HIV test - Viral suppression	- Incentive had no overall effect on either linkage or viral suppression	- Continuity in care (overall 8% higher in incentive sites; 19% higher in smaller HIV care sites)
<b>ADHERENCE*</b>						
Farber et al. A study of financial incentives to reduce plasma HIV RNA among patients in care. AIDS Behav. 2013;17(7):2293-300.	United States	HIV-infected adults on ART for >1 yr	\$100 monetary incentive to reward either suppressed VL or at least one log10 lower than lower VL in last year; only one incentive per 3 month window.	-Impact on workflow -Patient acceptability -Patient comprehension	- No adverse effects on workflow - Incentive acceptable and comprehensible to patients	- Viral load suppression (increased from 57% to 69% before vs. after the incentive intervention)
<b>PREVENTION</b>						
Cluver et al. Child-focused state cash transfers and adolescent risk of HIV infection in South Africa: a propensity-score-matched case-control study. Lancet Glob Health. 2013;1(6):e362-70.	South Africa	HIV-uninfected adolescents age 10-18	Assessed effect of household receipt of state-provided cash transfers on risky sexual behaviors	- Incidence of transactional sex, age-disparate sex, unprotected sex, multiple partners, and sex after drugs	- For girls, cash transfers reduced transactional and age-disparate sex; no effect on other behaviors - For boys, no effect	

**Table 1:** Published studies on the use of incentives and the HIV care cascade (continued)

Cluver et al. Cash plus care: social protection cumulatively mitigates HIV-risk behavior among adolescents in South Africa. AIDS. 2014;28 Suppl 3:S389-97.	South Africa	HIV-uninfected adolescents age 10-18	Assessed effect of social protection (food/cash support, parental care) on HIV risk behaviors	- HIV risk behavior	- Cash-plus care halved HIV risk behavior in adolescents	- Differences in gender (cash alone reduced HIV risk for girls, not boys)
Handa et al. The government of Kenya's cash transfer program reduces the risk of sexual debut among young people age 15-25. PLoS One. 2014;9(1):e85473.	Kenya	Adolescents age 15-25	Unconditional transfer of \$20/month to main caregiver in a household	- Sexual debut	- Reduced by 31% in households with cash transfer	- Condom use, number of partners, transactional sex (no significant program effects)
de Walque et al. Incentivising safe sex: a randomised trial of conditional cash transfers for HIV and sexually transmitted infection prevention in rural Tanzania. BMJ Open. 2012;2:e000747	Tanzania	Adults age 18-30	\$10 or \$20 for test results STI- and HIV-uninfected; testing occurred every 4 months	- Combined prevalence of four STIs	- Significant reduction in \$20 group; no reduction in \$10 group	- HIV, HSV-2, and syphilis prevalence
Baird et al. Effect of a cash transfer programme for schooling on prevalence of HIV and herpes simplex virus type 2 in Malawi: a cluster randomised trial. Lancet. 2012;379(9823):1320-9.	Malawi	Women age 13-22	Conditional (school attendance required) vs. unconditional cash transfers; lottery for girls to receive \$1-5 each month, lottery for parents to receive \$4-10 each month	- Prevalence of HIV and HSV-2 virus	- For those enrolled in school: HIV 1.2% intervention, 3% control; HSV-2 0.7% intervention, 3% control	- No difference in conditional vs. unconditional arms - For those dropped out of school at baseline, no difference between intervention and control
Nyqvist et al. Using lotteries to incentivize safer sexual behavior: Evidence from a randomized controlled trial on HIV prevention. World Bank, 2015. Policy Research Working Paper #7215.	Lesotho	HIV-infected or uninfected adults age 18-32	Lottery system with low expected payments, but chance of high prizes conditional on negative STI results	- HIV incidence	- 21.4% reduction over two years in intervention	- Relation between risk: Risk-loving individuals reduce unprotected sex acts by 0.3/month for every \$1 increase in expected prize

\*The four studies published from 2000-2007 [26-29] reviewed by Galarraga *et al.* [18] are not included in the Table.

HCT: HIV counseling and testing; ART: antiretroviral therapy; VL: HIV viral load

**Table 2:** Ongoing studies of incentives focused on different stages of the HIV care cascade, from Clinicaltrials.gov

Title	Clinicaltrials.gov number	Estimated Completion Date	Country	Target Population	Intervention	Primary outcomes	Secondary outcomes
<b>TESTING</b>							
n/a/							
<b>LINKAGE</b>							
Link4Health: A Combination Approach to Linkage and Retention for HIV-Infected Individuals in Swaziland	NCT01904994	December 2015	Swaziland	Recently diagnosed HIV-infected people	Combined intervention of POC CD4 testing, accelerated ART initiation, counseling session, basic care and prevention package, and financial incentive for linkage and retention (80 Swaziland rand distributed by mobile minutes)	<ul style="list-style-type: none"> <li>- Change in linkage rate at 1 month and retention rate at 12 months</li> </ul>	<ul style="list-style-type: none"> <li>- Proportion linked at 1 month</li> <li>- Proportion retained at 12 months</li> <li>- Time from testing to assessing ART eligibility</li> <li>- Proportion consistently engaged in care</li> <li>- Median CD4</li> <li>- Change in mortality rate</li> <li>- Proportion reporting the interventions were acceptable</li> <li>- Proportion receiving the intervention</li> <li>- Proportion with WHO stage 3/4 event</li> </ul>
ENGAGE4HEALTH: A Combination Strategy for Linkage and Retention in HIV Care Among Adults in Mozambique	NCT01930084	June 2016	Mozambique	Adults testing positive for HIV	Incremental assessment of non-cash financial incentives on a combination intervention strategy of POC CD4, accelerated ART initiation, and SMS appointment reminders	<ul style="list-style-type: none"> <li>- Linkage to care at 1 month</li> <li>- Retention in care at 12 months</li> </ul>	<ul style="list-style-type: none"> <li>- Time to linkage to care</li> </ul>
Conditional Cash Transfers to Increase Uptake of and Retention of PMTCT Services	NCT01838005	October 2015	Democratic Republic of Congo	Pregnant, recently diagnosed HIV-infected women	Small, increasing cash payments to pregnant women for clinic attendance and uptake of recommended services	<ul style="list-style-type: none"> <li>- Proportion of women who adhered to all conditions and delivered at a maternity clinic</li> </ul>	<ul style="list-style-type: none"> <li>- Mother to child transmission rate at 6 weeks</li> <li>- HIV-free survival at 18 months</li> <li>- Proportion HIV-exposed infants who received</li> </ul>

**Table 2:** Ongoing studies of incentives focused on different stages of the HIV care cascade (continued)

							DNA PCR and nevirapine
Testing and Linkage to Care for Injecting Drug Users in Kenya (TLCIDU Kenya)	NCT01557998	December 2015	Kenya	HIV-infected adults that are injection drug users	Point of care CD4 and peer case management with conditional cash transfers for linkage to care and ART initiation	<ul style="list-style-type: none"> <li>- Linkage to care and time to ART</li> <li>- Community viral load</li> <li>- Retention in care</li> </ul>	<ul style="list-style-type: none"> <li>- Modeling HIV transmission dynamics</li> <li>- Assessing cost-effectiveness of the intervention</li> </ul>
<b>ADHERENCE</b>							
Project HOPE – Hospital Visit as Opportunity for Prevention and Engagement for HIV-Infected Drug Users	NCT01612169	June 2015	United States	HIV-infected adults admitted to the hospital with reports of substance abuse and not currently or properly taking ART	Assessment of usual care, patient navigation, and patient navigation combined with incentivized contingency management	<ul style="list-style-type: none"> <li>- HIV viral load</li> </ul>	<ul style="list-style-type: none"> <li>- Substance use frequency, severity, and treatment</li> <li>- CD4 count and viral load</li> <li>- HIV care visit attendance</li> <li>- ART adherence</li> <li>- Hospitalization</li> <li>- Mortality</li> <li>- Social and behavioral mediators and moderators of outcomes</li> </ul>
A Commitment Device for Medication Adherence Among HIV Patients	NCT01455740	October 2014	United States	Adults on ART for a least 24 weeks with most recent viral load unsuppressed	Three arm study: incentive for taking medication, incentive for attending check-up, and option to choose which intervention to be placed in	<ul style="list-style-type: none"> <li>- HIV viral load</li> </ul>	<ul style="list-style-type: none"> <li>- CD4 counts</li> <li>- Provider check-up attendance</li> <li>- Adherence to medical regimen</li> <li>- Attitude and motivation</li> <li>- Demographic characteristics</li> </ul>
Project First – A Randomized Trial of an Abstinence-reinforcing Contingency Management Intervention to Suppress HIV Viral Load	NCT01376570	June 2016	United States	Adults on ART with low adherence and currently receiving treatment with methadone or buprenorphine	Contingency management consisting of vouchers that are exchangeable for goods and services; value of vouchers increases with continued evidence of abstinence starting at \$2.50; max earnings over the study period is \$1320	<ul style="list-style-type: none"> <li>- HIV viral load</li> </ul>	<ul style="list-style-type: none"> <li>- CD4 count</li> <li>- Abstinence from opiates, oxycodone, and cocaine</li> <li>- ART adherence</li> </ul>
Comparing Food and Cash Assistance for	NCT01957917	December 2015	Tanzania	HIV-infected adults who	Nutritional assessment and counseling combined with:	<ul style="list-style-type: none"> <li>- ART adherence (as measured by</li> </ul>	<ul style="list-style-type: none"> <li>- Change in food security</li> </ul>

**Table 2:** Ongoing studies of incentives focused on different stages of the HIV care cascade (continued)

HIV-Positive Men and Women on Antiretroviral Therapy in Tanzania				initiated ART within the last 90 days and are food insecure	nothing, alone, with food a food	Medication Possession Ratio)	<ul style="list-style-type: none"> <li>- Change in HIV viral load</li> <li>- Change in body mass index (BMI)</li> <li>- Change in weight</li> <li>- Change in participation in labor force</li> </ul>
Gender-Specific Combination HIV Prevention for Youth in High Burden Settings (MP3-Youth)	NCT01571128	November 2016	Kenya	Individuals age 15-24	Conditional cash transfers (CCT) for females to encourage school attendance; CCT to females as part of a combination HIV prevention package	- Uptake and coverage of the intervention	<ul style="list-style-type: none"> <li>- Adherence to PrEP, risk exposure for HIV-uninfected females</li> <li>- Adherence to ART for HIV-infected participants</li> <li>- Feasibility of cash transfer to keep girls in school</li> </ul>
<b>PREVENTION</b>							
Reducing HIV in Adolescents (RHIVA) (CAPRISA 007)	NCT01187979	December 2012, not yet published	South Africa	Adolescents (13 yr+)	Cash incentives for meeting milestones in a prevention and life skills program	- HIV incidence	<ul style="list-style-type: none"> <li>- Academic performance</li> <li>- Uptake of HIV testing</li> <li>- Substance use patterns</li> <li>- Pregnancy rates</li> <li>- Contraceptive use in females</li> <li>- Risk reduction behavior</li> <li>- Involvement in extra-curricular activities</li> </ul>
Effects of Cash Transfer for the Prevention of HIV in Young South African Women (HPTN 068)	NCT01233531	June 2015	South Africa	Females age 13-20	Monthly cash transfer payments for attending school thus reducing structural barriers to education	- HIV incidence	<ul style="list-style-type: none"> <li>- HSV-2 incidence</li> <li>- HSV incidence</li> </ul>
TLC-Plus: A Study to Evaluate the Feasibility of an Enhanced Test, Link to Care, Plus Treat Approach for HIV Prevention in the United States	NCT01152918	November 2014	United States	Adults receiving care at designated sites in Bronx, NY or Washington, D.C.	Coupon to HIV-infected patients at testing sites that can be redeemed at a participating HIV care site; financial incentive for confirmation of each suppressed viral load	<ul style="list-style-type: none"> <li>- Number of tests and newly identified cases</li> <li>- Initial CD4</li> <li>- Number people eligible for and receiving incentives</li> <li>- Cost of program</li> </ul>	<ul style="list-style-type: none"> <li>- Number of sex partners with whom the participant had unprotected sex</li> <li>- Number of people with whom the participant shared needles</li> </ul>

**Table 2:** Ongoing studies of incentives focused on different stages of the HIV care cascade (continued)

						<ul style="list-style-type: none"> <li>- Time from diagnosis to linkage</li> <li>- Proportion linked to care</li> <li>- Number and probability of suppressed viral load</li> </ul>	
Cambodia Integrated HIV and Drug Prevention Implementation Program (CIPI)	NCT01835574	September 2016	Cambodia	Adult female entertainment and sex workers	16-week contingency cash transfer to reduce the use of amphetamine as part of a larger prevention program (SMARTgirl)	- HIV risk behavior	- Amphetamine use
STAR: Seek, Test, and Retain. Linkages for Black HIV+, Substance-Using MSM	NCT01790360	April 2015, not yet published	United States	Black, substance-using adult men who have sex with men	Compare the effectiveness of financial incentives (in form of gift card) for attending first 3 HIV care visits with a patient navigation intervention that does not use incentives	- Linkage and retention rates	<ul style="list-style-type: none"> <li>- Dollars per patient linked and retained in care</li> <li>- Proportion of substance-using Black MSM who are recruited</li> </ul>

POC: Point-of-care; ART: antiretroviral therapy; SMS: short message service; PMTCT: prevention of mother to child transmission; PrEP: pre-exposure prophylaxis; PCR: polymerase chain reaction; CCT: conditional cash transfer; HSV: herpes simplex virus; MSM: men who have sex with men.

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