

Cost and Threshold Analysis of an HIV/STI/Hepatitis Prevention Intervention for Young Men Leaving Prison: Project START

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Abstract The objectives of this study were to: (a) estimate the costs of providing a single-session HIV prevention intervention and a multi-session intervention, and (b) estimate the number of HIV transmissions that would need to be prevented for the intervention to be cost-saving or cost-effective (threshold analysis). Project START was evaluated with 522 young men aged 18–29 years released from eight prisons located in California, Mississippi, Rhode Island, and Wisconsin. Cost data were collected prospectively. Costs per participant were \$689 for the single-session comparison intervention, and ranged from \$1,823 to 1,836 for the Project START multi-session intervention. From the incremental threshold analysis, the

multi-session intervention would be cost-effective if it prevented one HIV transmission for every 753 participants compared to the single-session intervention. Costs are comparable with other HIV prevention programs. Program managers can use these data to gauge costs of initiating these HIV prevention programs in correctional facilities.

Resumen Los objetivos de este estudio fueron: (a) estimar los costos de proveer una intervención de prevención del VIH en una sola sesión y una intervención en sesiones múltiples; y (b) estimar el número de transmisiones de VIH que habría que evitar para que la intervención ahorre costos o sea costo-efectiva (análisis de umbral). El proyecto START se evaluó con 522 hombres jóvenes de 18 a 29 años liberados de ocho prisiones de California, Mississippi, Rhode Island y Wisconsin. Los datos de costos se recogieron de forma prospectiva. Los costos por participante fueron de \$689 para la intervención de comparación en una sola sesión, y osciló entre \$1823 a \$1836 para la intervención del proyecto multi-sesión START. A partir del análisis de umbral incremental, la intervención en sesiones múltiples sería costo-efectiva si se impide una transmisión del VIH por cada 753 participantes en comparación con la intervención en una sola sesión. Los costos son comparables con otros programas de prevención del VIH. Directores de programas pueden usar estos datos para determinar los costos de iniciar estos programas de prevención del VIH en centros penitenciarios.

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Introduction

At year end 2009, 1.6 million adults were incarcerated in jails, and state and federal prisons in the United States (US)

[1]. The majority of incarcerated individuals were male and racial or ethnic minorities [1]. Since 1980, the number of people incarcerated in US prisons and jails has quadrupled [1]. Rates of confirmed AIDS, hepatitis and other sexually transmitted infections (STIs) are higher among persons entering correctional facilities than in the non-incarcerated population [2]. HIV risk behaviors have been documented both in the period immediately prior to incarceration [3–7] and in the period immediately following release from a correctional facility [8–11].

Due to the confluence of risk behaviors and the lack of services for formerly incarcerated individuals in the community, correctional facilities can be important sites for HIV testing and HIV prevention programs [12–14]. Recently, there have been rigorous evaluation studies that have demonstrated efficacy in reducing HIV/STI risk behaviors following release from custody [15–18]. The recognition that correctional facilities provide an important avenue for addressing HIV/STI/hepatitis in the community has made the analysis of costs associated with these health programs increasingly crucial. Resources are limited for interventions in the community and in correctional facilities. Program administrators need to know the cost as well as the effectiveness of a program, given that cost is often a significant factor in selecting HIV/STI/hepatitis interventions [19].

Despite the importance of cost data, few studies have evaluated the cost (or cost-effectiveness) of programs addressing HIV/STI/hepatitis prevention in correctional facilities, and fewer still have incorporated the evaluation of costs prospectively or as an integral part of the study design. Previous evaluations have not addressed prevention programs in correctional facilities, but rather costs associated with HIV counseling, testing, and partner notification [20–22]; universal screening for gonorrhea and Chlamydia [23]; hepatitis B vaccinations [24]; and methadone programs [25].

Varghese and Peterman [20] simulated the cost-effectiveness of providing HIV counseling and testing for people about to be released from prison. They concluded that, in a simulated population of 10,000 incarcerated people with an HIV prevalence of 1% and with 50% acceptance of counseling and testing, the program would detect 50 new infections and avert four future cases of HIV at a cost of \$125,000 to the prison system and a saving to society of over \$550,000 (1999 dollars). In a second simulation of 10,000 individuals with an HIV seropositivity rate of 1.5%, Varghese et al. [21.] projected that counseling and testing would prevent eight HIV infections and save society almost \$1,000,000. Partner notification for 113 persons with HIV would prevent another 1.2 HIV infections and save society an additional \$181,000. In their simulation, HIV and STI clinics would save \$32,000 per case

prevented by counseling and testing and an additional \$28,000 per case prevented by partner notification (1997 dollars). Shrestha et al. [22] assessed the costs of rapid HIV testing and counseling to identify previously undiagnosed HIV infections among people in jail. The average cost of testing ranged from \$29.46 to 44.98 for an HIV-negative individual and from \$71.37 to 132.72 for an individual with HIV (2005 dollars). Kraut-Becher et al. [23] showed that universal screening for chlamydia at jail intake was cost saving for women but cost \$4,856 more per case treated than presumptive treatment for men (2002 dollars). Pisu et al. [24] determined the cost-effectiveness of vaccinating incarcerated people for hepatitis B. They found that it was economically beneficial to the prison setting when the cost of a vaccine dose was less than \$30 (1998 dollars), or the incidence of infection was greater than 1.6% during incarceration and 50% after release. Finally, Warren and Viney [25] found that prison methadone programs compare favorably to community-based methadone programs when considering costs. The annual cost of offering prison methadone in New South Wales prisons was AUD \$2.9 million or \$3,234 per inmate per year (2003 Australian dollars).

In this paper we report the costs of two behavioral interventions evaluated during the Project START research study: single-session intervention and a multi-session risk-reduction intervention for young men being released from prison [26]. Project START research study participants were recruited in 2001 and 2002 from eight state prisons in four states (California, Mississippi, Rhode Island, and Wisconsin). The study sample included 522 young men, aged 18–29 years, who were systematically assigned to a pre-release single-session intervention or a pre- and post-release multi-session intervention. The single- and multi-session interventions both addressed HIV, hepatitis, and other STIs; and the multi-session intervention also addressed community re-entry needs (e.g. housing, employment). The single-session intervention consisted of a scheduled individual session prior to release. The multi-session intervention consisted of two scheduled individual sessions prior to release and four scheduled sessions at 1, 3, 6, and 12 weeks after release. The first in-prison session for both interventions focused on assessing HIV/AIDS, STI, and hepatitis knowledge and risk behavior; developing a personal risk reduction plan; and providing information, skills training and referrals as required. The second in-prison session focused on community re-entry needs and included assessment, planning, problem-solving if needed, and facilitated referral for housing, employment, financial problems, social relationships, substance abuse and mental health treatment, legal problems, and avoiding re-incarceration. In post-release sessions, the plans developed during previous sessions were reviewed and updated,

including discussion of facilitators and challenges to implementing the risk-reduction plan. In-prison sessions lasted 60–90 min, and post-release sessions were 30–60 min long. Additional post-release sessions were offered as needed. Participants in both intervention conditions were assessed at 1, 12, and 24 weeks post-release. Primary outcomes were sexual behaviors with any, main, and non-main partners, and non-sterile injection drug use. Intent-to-treat analyses were conducted to compare the two intervention groups at each post-release follow-up [26]. No significant differences were observed between the single-session intervention group and the multi-session intervention group at one-week or 12-weeks post-release. However, significant differences were observed at the final 24-week assessment, scheduled 12 weeks after the last post-release intervention session for the multi-session intervention group (or 24 weeks post-release for the single-session intervention session group). At 24 weeks, the multi-session intervention group was significantly less likely to report unprotected vaginal or anal intercourse at their most recent sexual encounter and less likely to report any unprotected intercourse during the reporting period compared to the single-session intervention study group.

Once evaluated and proven efficacious, the Project START multi-session intervention moved into the Centers for Disease Control and Prevention's (CDC) Replicating Effective Programs (REP) project which, in coordination with external partners, converted the research protocol and other guidance documents into a user-friendly package for local community-based agencies to implement. Through CDC's Diffusion of Effective Behavioral Interventions program (DEBI, www.effectiveinterventions.org), as of December 31, 2010, over 50 agencies across the US have been trained in delivering the multi-session Project START intervention.

In summary, this paper reports the costs associated with delivering Project START's single-session intervention and a multi-session intervention as well as incremental costs and the number of HIV transmissions that must be prevented among Project START intervention participants for this intervention to be considered cost-saving or cost-effective.

Methods

Standard methods of cost and threshold analysis were employed [19, 27–29]. Following the model of Gorsky [19], the cost analysis identified resources used in the prevention programs, determined the unit costs of these resources, and calculated the total costs of the programs. Specifically, we (a) selected a time period for the analysis, and counted participants served during the time period,

(b) categorized costs, (c) conducted an inventory of resources consumed in specific units, (d) estimated cost per unit of each resource type, counted the number of units consumed in each resource type, calculated total costs of the intervention, and expressed this cost on a per participant basis, and (e) conducted a threshold analysis to determine if the multi-session Project START intervention would be considered cost-saving, that is a program that demonstrates sufficient public health impact to ultimately save society money. Here, we focused on estimating the per-participant costs of Project START. Since rational resource allocation decisions are based on resource costs to society, the cost analysis was conducted from the societal perspective (all resources used by the intervention, regardless of who pays or who benefits) and from the provider's perspective (or community-based organization). We excluded the costs of conducting the evaluation research. All costs are expressed in 2009 dollars. This paper addresses only the determination of program costs and does not present data related to program effectiveness or benefits (the latter have been published elsewhere [5, 8, 10, 30–39]).

Selection of Time Period, Number of Participants

The present study included 522 Project START participants enrolled in eight prisons in the four study sites (California, Mississippi, Rhode Island, and Wisconsin) in a prospective cost analysis of both the single-session in-prison intervention and the multi-session transitional intervention over 24 months during 2001 and 2002.

Categorization of Costs

We identified resources in this study as variable costs and fixed costs (Table 1). Variable costs vary with program

Table 1 Variable and fixed costs of project START

Cost category	Inclusions
Variable costs: resources per participant	
A. Cost of staff time	Session related, travel, maintaining participant contacts, resource guide updates, office expenses, staff development/training
B. Cost spent on participant	Expense reimbursement, materials, participant pagers
Fixed costs: resources per program	
C. Facilities	Rent, utilities
D. Administrative time	Administrative and support staff time specific to the intervention
E. Communications	Telephone, pagers

output and are related to resources needed per participant for the implementation of the intervention. We subdivided variable costs into costs related to staff time and costs spent on participants. Fixed costs do not vary with the quantity of output in the short-run and include facilities, administrative time and communications.

Inventory of Resources

For the prospective cost data collection, Project START staff completed forms to record time and resources allocated to providing the intervention. The forms contained information about a) intervention provider time, b) personnel compensation and facility costs, and c) intervention materials, administration and other costs.

Intervention Provider Time Forms

On these weekly self-report forms, program personnel recorded the time they spent on intervention-related activities (listed below) to the nearest quarter of an hour and allocated this time to the single-session intervention or the multi-session intervention. The intervention provider time forms included categories for: (a) training and supervision (formal or informal training including any time spent receiving or providing supervision of intervention activities), (b) session-related activities (preparing for sessions, waiting for participants to arrive, conducting sessions, and following-up on participant-related activities), (c) Intervention-related travel (traveling to and from intervention related activities), (d) maintaining participant contacts (searching for or reminding participants of intervention sessions, for the multi-session intervention only), and (e) resource guide updates (developing and updating site-specific resource guides given to participants in both programs; time was allocated equally between the single-session intervention and the multi-session intervention programs). Participant recruitment and consent were research-related activities and were not included in this analysis.

Personnel Compensation and Facility Cost Forms

These forms were completed semi-annually by Project START administrators to determine staff compensation and facility-related costs necessary to provide the interventions. These costs included: (a) per hour personnel compensation costs for staff members delivering or supervising the intervention, and (b) monthly facility rental costs, including the percentage of office space used for intervention-related activities. In instances where the project was not charged for facility use, the fee the facility would have charged was estimated.

Intervention Materials, Administrative and Other Costs Form

Data reflecting monthly use of intervention materials, administrative time and other costs were collected by project staff. The form contained three categories: (a) participant materials (material costs related to intervention sessions, maintaining contact with participants for the multi-session intervention, and intervention training), (b) intervention-related expenses (telephone calls, pagers and pager services for the multi-session intervention, office materials, postage and shipping), and (c) administrative support time.

Total Costs, Cost per Participant

During the project period, we used specific counts of resource units. Through the multiplication of unit costs (e.g. hourly salaries and percentage of time allocated to intervention-related activities) by the number of units used during the program period, we determined the cost of resources for the two-year duration of the project. From this, we calculated the total costs of the intervention and per participant costs.

Threshold Analysis

For simplicity, we refer to Project START program costs per participant as “C”. To conduct a threshold analysis, we introduce three additional parameters: “*T*” = the medical treatment costs averted each time an HIV transmission is averted; “*Q*” = the number of quality adjusted life years (QALYs) saved for each HIV transmission averted; and “*W*” = the price society appears to be willing to pay to “buy” a quality-adjusted life year (QALY). *T*, *Q* and *W* were obtained from the literature [28, 40–43]. *T* has been estimated to range from \$244,255 to over \$330,722 (2009 dollars; expressed in net present value terms at a 3% discount rate). We employed the low value for the threshold analyses. *Q* has been estimated at 11.23 QALYs (expressed in net present value terms). *W* is a subject of debate in the literature, and the ubiquitous \$50,000 used here was based on the literature [44]. If an intervention can save a QALY for \$50,000, the intervention appears to be cost-effective in comparison with other interventions in medicine and public health [44].

The number of HIV transmissions that must be averted to claim that Project START is cost-saving can be expressed as C/T . The number of HIV transmissions that must be prevented to claim that Project START is cost-effective (even if cost-saving) is $C/(T + (W \times Q))$. The transmissions averted could be “downstream transmissions” averted among HIV-seronegative partners of Project

START study participants or they could be “downstream transmissions” averted among partners of the partners of Project START study participants.

Results

A total of 259 and 263 men participated in the single-session intervention and the multi-session intervention, respectively (see Table 2). Table 2 displays the cost of Project START in all sites combined from the societal and provider perspectives (the societal perspective includes all costs; the provider perspective considers what a provider would pay). Note that the single-session intervention consisted of an individual session prior to release only (there were no sessions after release), so that there were no costs incurred for the single-session intervention pertaining to staff travel, maintaining participant contact, expense reimbursement or participant pagers.

In this section, we highlight the results from the societal perspective. Overall, the cost per participant for the multi-session intervention compared to the single-session intervention shows that the marginal cost for the additional five sessions, including sessions in the community after release,

was relatively low (\$689 for one session vs. \$1836 for five additional sessions).

For both interventions, variable costs (cost of staff time and cost spent on the participant) were larger than fixed costs. Staff time was the most costly component, with training and supervision the most costly component of staff time. The difference in the percentage of costs devoted to staff training and supervision in the single-session intervention (54.4%) and the multi-session intervention (25.7%) was due to the difference in the number of sessions delivered per participant (one session vs. six sessions). Another difference was the cost of ensuring program retention with the multi-session intervention participants in the community after release from prison. This included costs associated with travel, maintaining participant contacts, and communication (staff cell phones and participant pagers) by the multi-session intervention. An aim of the project was high participant retention (ranging between 65.8 and 79.8% [26]) by maintaining contact with participants and making it as convenient as possible for participants to attend intervention sessions, by scheduling sessions at convenient times for participants and conducting sessions at convenient community locations (e.g. community offices, coffee shops, and participants’ homes).

Table 2 Project START cost per participant and total costs for the single-session intervention and the multi-session intervention

Cost component	The single-session intervention			The multi-session intervention		
	Cost per participant (N = 259)	Total costs	% of total societal costs	Cost per participant (N = 263)	Total costs	% of total societal costs
Variable costs						
Cost of staff time						
Training and supervision	\$374.89	\$97096.66	54.4	\$471.82	\$124087.98	25.7
Session related	\$85.14	\$22051.44	12.4	\$287.78	\$75685.72	15.7
Travel	\$52.30	\$13545.27	7.6	\$225.05	\$59188.21	12.3
Maintaining participant contact	\$0.00	\$0.00	0.0	\$184.82	\$48608.41	10.1
Office expenses	\$15.77	\$4084.42	2.3	\$50.86	\$13376.60	2.8
Resource guide update	\$9.37	\$2427.50	1.4	\$9.37	\$2464.98	0.5
Cost spent on participant						
Expense reimbursement	\$0.00	\$0.00	0.0	\$13.00	\$3419.00	0.7
Materials	\$3.38	\$876.41	0.5	\$23.15	\$6089.69	1.3
Participant pagers	\$0.00	\$0.00	0.0	\$107.00	\$28141.00	5.8
Fixed costs						
Rent	\$144.47	\$37416.78	21.0	\$406.04	\$106789.02	22.1
Administrative time	\$3.32	\$859.88	0.5	\$13.64	\$3587.23	0.7
Communications	\$0.00	\$0.00	0.0	\$43.12	\$11341.56	2.3
Provider total ^a	\$688.64	\$178358.36	100.0	\$1822.66	\$479360.41	99.3
Societal total ^b	\$688.64	\$178358.36	100.0	\$1835.66	\$482779.41	100.0

Percentages may not add to 100% due to rounding

^a Provider total excludes expense reimbursement (the value of participants’ time)

^b Societal total includes all cost categories

Cumulative costs for travel for the multi-session intervention were approximately four times that of the single-session intervention (\$59,188 vs. \$13,545). Total costs for maintaining contact with multi-session intervention participants after release were \$48,608. To determine the cost per pager for participants in the multi-session intervention, we used an approximate cost of \$55 per unit and \$13 monthly for service charge for 4 months. Thus, the price per pager per participant was $((4 \times \$13) + \$55 =) \$107$. The cost of participant pagers, exclusive to the multi-session intervention, represented 5.8% of total program costs.

For the multi-session intervention, post-release sessions occurred in community settings, the participant's home, or in prison for participants who were re-incarcerated during the course of the intervention. For sessions that occurred in community settings, \$13 were offered to defray participant costs, such as child or elder care. By multiplying the reimbursement by the number of participants who attended the four post-release sessions, we determined total participant costs. Participants' expense reimbursements represented 0.7% of total program costs for the multi-session intervention.

Participant materials accounted for 0.5 and 1.3% of costs for the single-session intervention and the multi-session intervention, respectively. Materials included: (a) two prevention brochures for the first session, (b) one and two resource guides for the single-session intervention and the multi-session intervention, respectively, (c) 10 male condoms and two female condoms (post-release sessions 3–6); and (d) 10 packets of lubricant (post-release sessions 3–6).

Fixed costs included facility rental, administrative time and communication costs. From the societal perspective, facility costs represented the largest fixed costs in the single-session intervention- and the multi-session intervention conditions, accounting for 21.0% of costs for the single-session intervention and 22.1% of costs for the multi-session intervention. Less than 1% of costs were

spent on administrative time, 0.5% for the single-session intervention and 0.7% for the multi-session intervention. Communications, including telephones and staff pagers, were associated only with post-release intervention sessions in the multi-session intervention and accounted for 2.3% of total costs of that program.

Table 3 summarizes intervention staff time. Training and supervision accounted for 60.3% of staff time in the single-session intervention and 30.5% of staff time in the multi-session intervention. Maintaining participant contacts, specific to the multi-session intervention, represented 17.9% of staff time. As described above, the cost of retaining participants in the multi-session intervention included the amount of staff time spent maintaining contact with participants (including telephone calls). Because the multi-session intervention included four sessions delivered after release from prison, time spent in travel to and from intervention sessions (14.9% in the single-session intervention and 22.8% in the multi-session intervention) and time spent maintaining participant contacts (17.9% of time for the multi-session intervention) were greater for the multi-session intervention. Staff time related to delivering intervention sessions (22.3 and 27.9%, in the single-session intervention and the multi-session intervention, respectively) and resource guide update (2.6% in the single-session intervention- and 1.0% in the multi-session intervention) was similar.

Table 4 presents the results of the threshold analyses. For illustration, we see that the cost-saving threshold from the societal perspective when comparing the single-session intervention and the multi-session intervention (incremental) is 0.00470 (0.00464 from provider's perspective). That is, for each Project START participant, if 0.00470 HIV transmissions were avoided, the multi-session intervention would be cost-saving in terms of medical care costs averted when compared with the single-session intervention. Focusing only on first-generation transmissions when compared with the single-session intervention, the multi-

Table 3 Hours per participant and total hours of project start staff time spent on intervention-related activities

Cost component	The single-session intervention			The multi-session intervention		
	Hours per participant (<i>N</i> = 259)	Total hours	% of total hours	Hours per participant (<i>N</i> = 263)	Total hours	% of total hours
Intervention activity						
Training and supervision	9.4	2447.4	60.3	12.7	3352.7	30.5
Session related	3.5	904.5	22.3	11.7	3067.5	27.9
Travel	2.3	602.8	14.9	9.5	2510.5	22.8
Maintaining participant contacts	0	0	0.0	7.5	1967.1	17.9
Resource guide update	0.4	103.6	2.6	0.4	105.2	1.0
Total hours	15.7	4058.3	100.0	41.8	11003.0	100.0

Table 4 Threshold numbers of HIV transmissions to be averted per participant so as to claim cost-savings or cost-effectiveness for project START

	Cost-saving threshold	Cost-effectiveness threshold
Provider's perspective		
The single-session intervention	0.002819	0.000798
The multi-session intervention	0.007462	0.002111
Incremental (Single–Multi)	0.004643	0.001314
Inverted incremental	1 per every 215 participants	1 per every 761 participants
Societal perspective		
The single-session intervention	0.002819	0.000798
The multi-session intervention	0.007515	0.002126
Incremental (single–multi)	0.004696	0.001329
Inverted incremental	1 per every 213 participants	1 per every 753 participants

session intervention would be cost-saving if one out of every 213 men released from prison avoided HIV transmission (215 men from the provider's perspective), and it would be cost-effective if it prevented one HIV transmission for every 753 participants (761 participants from the provider's perspective).

Discussion

The present study used standard cost analysis techniques to assess the costs and efficiency of a single-session intervention and an enhanced multi-session intervention (Project START) for young men released from eight prisons in four states (California, Mississippi, Rhode Island, and Wisconsin) in the US. Costs per participant ranged from \$689 for the single-session intervention and \$1,823–1,836 for the multi-session intervention. The incremental threshold analysis showed that if one out of every 213 men released from prison avoided HIV transmission, the Project START multi-session intervention would be cost-saving compared to HIV prevention delivered in a single-session intervention format. The multi-session intervention would be cost-effective if it prevented one HIV transmission for every 753 participants when compared with the single-session intervention.

This study is unique given that a prospective study of program inputs and costs was conducted during the research trial. This is the first study to have documented costs of an efficacious HIV/STI/hepatitis risk reduction intervention with young men being released from prison. Furthermore, the threshold analyses provide us with performance standards by which to judge that a program such as the Project START multi-session intervention could be considered cost-saving or cost-effective (in HIV prevention terms), thereby answering the affordability question that many service providers have.

The estimates of training and supervision costs represented the need for cross-site consistency in program delivery and fidelity to the intervention protocol demanded by the study. A Community Based Organization (CBO) delivering these interventions may not require the same degree of expenditure on staff training and supervision, although staff turnover in CBOs (and in the research sites in this study) creates a continued need for staff training and supervision.

There are some clear limitations to this study. First, an overall economic measure that includes both costs and primary data for effectiveness has not yet been calculated for Project START. Second, for cost estimates, we did not conduct a time-motion study that would have further tracked intervention staff day-in and day-out as they provided services. Time-motion studies are extremely intrusive to staff and expensive to conduct. However, given that data were collected prospectively and weekly for intervention and project staff, time-motion studies would have added relatively little to the precision of our estimates. Moreover, although costs specific to staff and participant pagers may no longer be relevant given advancements in communication technology, cell phone costs would be nearly equivalent. Third, the threshold analyses focus on Project START as an HIV-prevention intervention and do not include reductions in other undesirable outcomes such as other infectious diseases, and untreated chronic diseases. These other potential consequences have economic ramifications and could legitimately be included in the threshold analysis which would likely increase the cost savings of the multi-session intervention.

Although the threshold standards are set fairly high, they appear potentially achievable. For the 263 participants who received the multi-session intervention through Project START, only one first generation or downstream transmission of HIV would have to be prevented to claim that Project START was cost-effective. In comparing Project

START costs with other intervention costs (from the literature), per participant costs (in 2009 dollars) for HIV prevention vary from \$72 (for a single-session video-based intervention directed at at-risk men) to \$2,383 (for a counseling, peer education, HIV testing intervention for men who have sex with men) [42]. Thus, the costs documented for Project START are in the range reported in the literature. Similarly, when comparing Project START infections averted with infections averted per participant from the literature, they vary from 0.000007 (for a post exposure prophylaxis after insertive anal intercourse for men who have sex with men intervention) to 0.01 (for a counseling, peer education, HIV testing intervention for men who have sex with men) [42]. Infections averted per participant reported in Table 4 are in the range found in the literature. However, cross-study comparisons may be difficult to interpret due to differences in intervention strategies and target populations, and in the methods and parameter values used to assess intervention cost-effectiveness [42]. While we must wait for a full economic evaluation to be conducted (including both costs and primary data for effectiveness) to know if this number of transmissions is indeed averted, the threshold appears highly achievable.

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