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Feasibility of a combination HIV prevention program for men who have sex with men in Blantyre, Malawi

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Abstract

Introduction—The use of combination HIV prevention interventions (CHPI) now represent the standard of care to minimize HIV acquisition risks among men who have sex with men (MSM). There has been limited evaluation of these approaches in generalized HIV epidemics and/or where MSM are stigmatized. A peer-based CHPI program to target individual, social, and structural risks for HIV was developed for MSM in Blantyre, Malawi.

Methods—To test the feasibility of CHPI, adult MSM were followed prospectively from January 2012–May 2013. Participants (N=103) completed sociobehavioral surveys and HIV testing at each of three follow-up study visits.

Results—Approximately 90% of participants attended each study visit and 93.2% (n=96) completed the final visit. Participants met with peer-educators a median of 3 times (range: 1–10) in follow-up visits 2 and 3. Condom use at last sex improved from baseline through follow-up visit 3 with main (Baseline:62.5%, Follow-up 3:77.0%, p=0.02) and casual male partners (Baseline: 70.7%, Follow-up 3:86.3%, p=0.01). Disclosure of sexual behaviors/orientation to family increased from 25% in follow-up 1 to 55% in follow-up 3 (p<0.01).

Discussion—Participants maintained a high level of retention in the study highlighting the feasibility of leveraging community based organizations to recruit and retain MSM in HIV prevention and treatment interventions in stigmatizing settings. Group-level changes in sexual behavior and disclosure in safe settings for MSM were noted. CHPI may represent a useful model to providing access to other HIV prevention for MSM and aiding retention in care and treatment services for MSM living with HIV in challenging environments.

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Author Contributions:

SB, CB, AW, GT, ASM, and EU collaborated in the design and oversight of the study. AW, SB, MB, and VJ developed survey instruments; VJ and DK oversaw data collection; and SK and AW conducted statistical analysis. AW wrote the initial drafts of this manuscript. All authors had full access to the data, reviewed and edited the manuscript, and all take responsibility for its integrity as well as the accuracy of the analysis.

Introduction

The last decade of research has provided a new evidence base of the global epidemiology of HIV among men who have sex with men (MSM) and effective interventions to reduce HIV transmission and acquisition risks.^{1,2} Globally, MSM face an increased burden of HIV, relative to the other reproductive age men; yet, as of 2008, only 5–10% of MSM had access to any HIV prevention programming with the majority of programming for MSM reported in high-income countries.³ While this estimate may have increased in recent years and effective HIV prevention programs are emerging for MSM, there remains limited access to HIV prevention programs for MSM in many regions of the world. Improvements and access to HIV prevention programming are often challenged by limited resources and structural barriers related to stigma or criminalization of same-sex practices.⁴

The generalized HIV epidemic in Malawi has stabilized from 21% HIV prevalence in the earlier stages of the epidemic to an estimated 8% HIV prevalence among adult men.⁵ As in many Sub-Saharan African countries, same-sex practices are criminalized in Malawi and subject to a penalty of prison or fine.⁶ A study conducted in 2008 of HIV among MSM in Southern Africa found that MSM were vulnerable to both HIV infection and structural barriers limited access to HIV prevention in Malawi.^{7–9} In this study, HIV prevalence was measured at 21.4% (N=201), with 95.3% of seropositive participants reportedly unaware of their HIV status. Over 40% of the sample reported experiencing discrimination, including denial of healthcare.⁹ HIV knowledge related to same-sex practices was limited, as MSM were more likely to have received information about preventing HIV transmission during sex with women than with men. Sexual behaviors were independent predictors of prevalent HIV infection in this study, including increasing number of male partners and inconsistent condom use with men.⁷ These findings were supported by two more studies in the region.^{10,11} The most recent epidemiologic study of MSM in Blantyre (N=338) recruited men using respondent-driven sampling methods (RDS) and demonstrated an unweighted HIV prevalence of 15.4% (RDS-weighted 12.5%, 95%CI: 7.3–17.8).¹¹ Qualitative data from that same study highlighted social barriers to purchasing condoms and concerns about accessing health services for STI related to anal intercourse and, likewise, providers expressed concerns about providing risk reduction counselling for a criminalized behaviour.¹²

These studies demonstrated a need for appropriate and targeted HIV prevention for MSM in Malawi. Until 2013, the National HIV Prevention Strategy and the National AIDS Framework included MSM as a key population for HIV prevention, providing broad recommendations to “improve services” and “engage media”.^{13,14} Yet, the contradiction between legal policies that criminalize same-sex practices and national HIV strategies that promote HIV prevention for MSM has challenged provision of HIV prevention services and access by MSM in need of care.^{12,15} Moreover, the near exclusive focus on serodiscordant heterosexual transmission and mother-to-child transmission in national strategies has likely played a role in reducing HIV transmission among reproductive age adults, but also created a low HIV risk perception among MSM.¹⁶ While these efforts have had important impacts on the HIV epidemic, comprehensively addressing risks among MSM has the potential to improve the effectiveness of HIV prevention programs. MSM and other key populations,

have recently received greater recognition in the National HIV strategy in Malawi, which now includes recommendations for comprehensive HIV prevention and treatment approaches to be established.¹⁷ These changes may enable new opportunities to provide interventions to reduce the burden of HIV among MSM in the Malawi. While standalone interventions have been tested among MSM in Sub-Saharan African settings, there are limited evaluations of combination interventions available for MSM in the region.¹⁸

Considering the high prevalence of HIV among MSM, individual-level acquisition risks for HIV, and the role of structural factors in access to HIV prevention for MSM, the Johns Hopkins Center for Public Health and Human Rights collaborated with a community-based organization, the Center for the Development of People (CEDEP), and the University of Malawi College of Medicine to develop and test the feasibility of providing a combination HIV prevention intervention (CHPI) for MSM in Malawi. CHPI was a community-based intervention, which aimed to target and mitigate the structural, social, and individual level barriers to HIV prevention found to be associated with higher HIV risks among MSM in Malawi.

Methods

Overview

A prospective study was conducted from January 2012 – June 2013 and aimed to assess the feasibility of implementing the CHPI to provide HIV prevention to MSM in a setting where MSM are stigmatized and hidden. We investigated retention in the HIV prevention program, uptake of services, and group level changes in sexual behavior and social interactions over the course of follow-up.

Study Population and Research Site

CHPI participants were recruited from the pool of MSM who participated in the baseline study which utilized respondent-driven sampling (RDS).¹¹ Eligible individuals were invited from the baseline study to participate in the 12-month prospective study in Blantyre Malawi. Eligibility criteria for the baseline study included being aged 18 years or older, assigned male at birth, reports having sex with another man in the last 12 months. Eligibility criteria for the CHPI cohort included completed the baseline study; had a negative HIV diagnosis determined by the baseline rapid and confirmatory tests; planned to live in Blantyre for the next 12 months; and provided consent to participate in a prospective study with four follow-up visits.

Study Activities

MSM from the RDS study who were enrolled in the CHPI cohort participated in the baseline survey and were initially asked to return to the CEDEP office for four follow-up sessions which would include completion of socio-behavioral surveys and biologic sampling at 3, 6, 9, and 12 months. Security breaches, however, closed the study site temporarily, from May to October 2012, and participants were subsequently asked to complete only baseline and three follow-up evaluations at 10, 13 and 16 months from baseline (termed Follow-up 1, Follow-up 2, and Follow-up 3, respectively). All follow-up assessments took place in the

private CEDEP study office. Survey administration and biologic sampling with referrals followed the same processes as the baseline assessment and have been previously described in detail.¹¹

Follow-up surveys were interviewer-administered and identical to baseline surveys,¹¹ with the exception of the inclusion of an additional module to assess frequency of use and acceptability of CHPI interventions and peer educators. Briefly, survey measures included socio-demographic characteristics; substance use; sexual behavior and relationships; and disclosure of orientation or sexual practices to family and peers. HIV knowledge and prevention exposures were measured, including aspects of condom and condom compatible lubricant (CCL) use; HIV testing and counseling (HTC) exposures; and access to and uptake of health services. Questions related to CHPI program use measured the frequency of visiting peer educators, types of discussions held with peer educators, and recent use of health facilities. These items were not included in the baseline survey because the intervention began after baseline was completed. All measures were self-reported.

CHPI participants completed rapid HIV and syphilis testing, following completion of the survey. A trained nurse from the College of Medicine conducted all pre- and post-test counseling procedures, blood specimen collection, and HIV and syphilis testing. HIV and syphilis testing methods have been previously described.¹¹ Participants testing positive for HIV and/or syphilis were referred to the local hospital or to the Johns Hopkins ART/STI clinic located at Queen Elizabeth Central Hospital, both of which had participated in the CHPI health sector training. Participants were provided an incentive of 500 Malawian Kwacha (equivalent to \$2) for each study visit.

Statistical Analyses

Analysis of behavioral and socio-demographic factors were conducted using Stata Statistical software, version 13 (StataCorp, 2011) to calculate descriptive estimates of participant characteristics and CHPI program use at each study period. Because our objective was to assess the feasibility and general behavior changes among the MSM sample, we estimated group level behaviors at each study visit to assess overall changes in uptake and behavior among the sample and across the visits. Variables relating to visiting a healthcare provider and disclosing sexual identity/behaviors to a family member or a health care worker were assumed to be cumulative across periods (i.e. an event that was satisfied if reported at least once during the study). Remaining variables are reported as the distribution among those participating per follow-up visit. Differences in uptake of services and behavior across study visits were compared using a nonparametric test for trend in ordered groups.^{19,20}

Human subjects research and protections

All research activities associated with this study were reviewed and approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and the College of Medicine Review and Ethics Committee (COMREC) at the Malawi College of Medicine. Intervention and study activities were suspended at the end of May 2012, due to security threats affecting gay men and other MSM in the area and study site. All study participants and both ethical review committees were immediately informed of security threats and

temporary closures of the study. The study resumed five months later in mid-October 2012, after no additional threats to security were identified and following approval from both ethical review committees.

The CHPI Intervention

The intervention was informed by previous research conducted in Malawi,^{7-9,11} formative qualitative research conducted at the initiation of this project,¹² and systematic reviews examining appropriate packages of HIV interventions for MSM.¹ In light of the current political and social climate, we sought to develop a method to reach and retain MSM in a confidential and safe manner to ensure access to prevention. The intervention was developed to target three key levels of influence: individual, healthcare, and community levels (Figure 1). Given limited resources and unknowns about retention of MSM in this setting, the intervention consisted of a combination of primarily behavior and structural interventions with the intention of assessing feasibility for potential future trials of biologic interventions. The individual-level component included outreach and education provided by 10 trained peer educators as well as the CEDEP study office and aimed to reduce behavioral risks for HIV (e.g. inconsistent condom use during anal intercourse) and improve use of HIV prevention methods. Peer education training curriculum was adapted from the Fenway Guide and the MSMGF-JHU guide, now available online.^{21,22} Peer educators, who had an average of two years of previous peer education experience, were provided with an intensive two-day training based on the Fenway guide and were provided with condoms and CCLs to distribute to participants. Regular screening for HIV and syphilis during follow-up assessments was also included. The health sector intervention focused on providing an intensive training with pre- and post-test evaluation of 25 staff (physicians and nurses) from five clinics and hospitals to improve knowledge of MSM health and improve access to and uptake of HIV testing and counseling (HTC) and STI programs among MSM. Peer educators and CEDEP staff members informed study participants of which clinics and health facilities had received training. The community-level intervention focused on capacity-building through the empowerment of CEDEP and peer educators with an aim to increase community penetrance of HIV prevention packages; provide epidemiologic evidence to support decriminalization of homosexuality as a public health imperative; and improve advocacy for greater inclusion of MSM in the Malawian National HIV strategies. Full description of the CHPI is available in the online supplemental material.

Results

A total of 103 MSM were enrolled in the CHPI cohort and participated in follow-up assessments from January 2012 through May 2013. Of the 103, 83 participants attended baseline and all three follow-up assessments and 96 completed the final study visit, resulting in an overall retention of 93.2%. The cancelation of the first planned study visit left a prolonged period from baseline to first follow-up, lasting approximately 10 months from baseline.

Enrolled participants were a median age of 25 years (range: 18 – 43), 65.1% (67/103) completed secondary education or higher. Some 68.9% (71/103) were gay or homosexually

identified and approximately 6.8% (7/103) were married/cohabitating with a woman at baseline. Participants reported a range of 0 to 3 children (Table 1).

Table 2 displays CHPI participation and health care utilization among participants from Follow-up visits 1 through 3, after the intervention was initiated. The median number of contacts with peer educators during each study follow-up visit was a low of 1.5 in Follow-up 1 and approximately three contacts in Follow-up visits 2 and 3. Participants reported predominantly receiving both condoms and lubricant across study visits (Follow-up 1: 33.3%, Follow-up 2: 51.1%, Follow-up 3: 70.8%). High proportions reported discussing HIV testing with peer educators during contacts (Follow-up 1: 69.2%, Follow-up 2: 88.5%, Follow-up 3: 81.6%; $p<0.001$). Discussions about mental health increased from 41.7% in Follow-up 1 to more than 70% in periods 2 and 3 ($p<0.001$). Discussions of sexual behavior also increased from 62.8% to 80.9% from Follow-up visits 1 to 3 ($p<0.01$). By the third study visit, almost 93% participants reported feeling that their access to condoms and lubricants had improved with participation in the CHPI study ($p<0.001$).

Table 3 presents group trends in behavior and HIV prevention practices from baseline through Follow-up 3. Over the course of the study, seven participants (7.6%) were diagnosed with a new HIV infection and all were identified in Follow-up 1. One to two participants were diagnosed with new syphilis infections in each period. Condom use at last sex with main male partner improved from a baseline of 63% (60/96) to 77% (57/74) in Follow-up 3 ($p=0.02$). Condom use with casual male partner demonstrated significant improvement from baseline (70.7%; 53/73) through Follow-up 3 (86.3%; 63/73; $p=0.01$). Proportions reporting condom use were higher in Follow-up 2 for both sex with main and casual male partners. Consistent improvements in use of water-based lubricants were observed, with 29% (28/97) reporting use at baseline and 74% reporting use at Follow-up 3 (71/96; $p<0.001$). This was consistent with improvements in knowledge of appropriate lubricants to use with condoms, which increased from 36% (32/89) at baseline to 73% (70/96; $p<0.001$) at Follow-up 3. Knowledge of risk related to anal sex, including type of sex and riskiest position was low at baseline (13.1% and 32.6%, respectively) and improved over time but remained at less than 50%. Disclosure of sexual identity/behaviors with family member increased from 25% (25/100) in Follow-up 1 to 55% (52/94; $p<0.01$) in Follow-up 3.

Discussion

This study presents the feasibility assessment of a combination HIV prevention program for MSM in Blantyre, Malawi. CHPI leverages interventions addressing multiple levels – individual, health sector, and social – and allowed for an evaluation of engagement, retention, and group-level behavioral change of MSM in HIV programming. Primarily, the CHPI demonstrated high retention with 93% of the sample remaining engaged by the end of the study. Importantly for criminalizing and other challenging settings, this study demonstrates that HIV prevention programs for MSM can be implemented if security measures and awareness of the social and political situation are well maintained. CHPI built on the well-established model of peer educators to engage MSM in services.^{23,24} These peer educators understand the challenges that MSM face and enabled participants to confidentially access individually tailored HIV prevention services, which substantially

aided retention in the program. Despite initial challenges, increased uptake of CHPI services increased over the course of the study, particularly those provided by peer educators, potentially suggesting improved levels of comfort with the intervention and awareness of services. Overall, participants reported a median of three visits with assigned peer educators per period, averaging one visit per month, as study duration increased. This increased engagement with peer educators was consistent with increased reports of access to condoms and discussions of mental health with peer educators over the course of the study. In other settings, the use of peer educators has shown benefit in improving uptake of HIV testing and improved HIV knowledge among MSM^{18,24} and community-based programs have demonstrated increased access to and use of condoms and appropriate lubricants in South Africa.²⁵ Building on this evidence, CHPI programs implemented by community-based organizations does support the retention of MSM in stigmatizing settings. This approach may be leveraged by clinical trials and implementation science studies that focus on ART-based HIV prevention and treatment approaches such as oral or topical pre-exposure prophylaxis (PrEP) and universal coverage of ART.

While this was a feasibility assessment, several changes in group-level sexual risk behaviors were noted. These included improvements in access to and self-reported condom and lubricant use. Knowledge of sexual transmission risk associated with same-sex practices was low, however, and remained under 50% by the end of the intervention, suggesting need for alternative forms of information to understand the sexual risks related to different behaviors. Overall, the access to peer educators and engagement in CHPI provided a mechanism through which MSM were able to obtain condoms and lubricants when these materials were needed. Given the importance of CCL in improving the efficiency of condoms to prevent HIV transmission during anal intercourse, these data suggest that alternative methods of implementation of CCL distribution programs that go beyond the standard practice of the sale of CCL are needed.^{11,26-28} A recent meta-analysis also supports the efficacy of peer-led interventions in reducing unprotected anal intercourse among MSM (effect size: -0.27; 95% CI: -0.41 - -0.13).²⁹ Taken together with these results, this suggests that community-driven and peer-led interventions represent appropriate models of implementation for programs focused on condom and CCL distribution and other preventive methods. However, further implementation science research is needed to characterize the best methods of implementing other approaches of HIV prevention, condom and CCL distribution for MSM in Malawi, given the limited access to clinically and culturally competent care that still exists in many settings across the country.¹²

Participants reported increases in disclosure of sexual practices and orientation to family members and to health care providers. Improvement in safe disclosure is important, given consistent findings that demonstrated high levels of stigma that limit disclosure of sexual practice to health care workers.¹¹ There are several reasons as to why disclosure of sexual orientation is important including appropriate risk classification and meaningful risk reduction counseling.³⁰ However, disclosure in stigmatizing environments or where same-sex practices are criminalized could represent a risk for both MSM and even the provider highlighting the importance of ensuring access to safe spaces for MSM to seek care. Consequently, characterizing these safe spaces that will facilitate effective health care engagement for MSM in stigmatizing settings is vital as part of a HIV prevention and

treatment response. To support the development of these safe spaces, a number of health sector trainings have been developed to inform health care workers about health needs and HIV risks among MSM and reduce stigmatization of MSM, including the Fenway Guide and an online program by MARPs Africa.^{21,22,31} In Kenya, a similar two-day, health sector training demonstrated sustained reductions by three months post-intervention in provider homophobia and improvements in knowledge about MSM health and HIV risks.³² The message from these curricula suggest that the most effective health sector interventions are those that include both cultural and clinical competency training and also engage local clinic champions to potentiate sustained benefit.

The conclusions reported here should be viewed in light of several limitations. The methods represented here were an implementation feasibility of assessment of CHPI for MSM and focused on assessing the implementation of the program, retention of participants, and group-level behavior change. While several improvements in sexual behavior and HIV prevention use were noted, these should not be viewed as measures of efficacy, given the small sample size and non-randomized design. As with all behavioral research and self-reported measures, behavioral results may be subject to social desirability bias as well as to effects of repeat testing during prospective study. While we collected data on HIV infection at each study visit, this was not an efficacy study that aimed to reduce HIV incidence nor was it hypothesized the HIV acquisition would be prevented given the high force of HIV infection among MSM and expert opinion that behavioral interventions may result in limited reduction of incidence in high incidence settings, relative to biomedical approaches.^{1,33} Seven participants seroconverted in the study and all seroconverted during the first study period. Though this is consistent with other incidence studies among MSM in African settings,³⁴ it could also be reflective of early, undetectable infection at enrollment or acquisition during the period when the study was temporarily closed. This study does demonstrate the feasibility of conducting longitudinal research in Blantyre and a larger trial could, if carefully implemented, be conducted among MSM to test the efficacy of other interventions, including biomedical interventions, and HIV outcomes. This study focused on assessing the feasibility of the CHPI program and overall improvements in group-level behaviors; thus, we did not conduct individual-level analysis of behavior change. Such analysis is underway to assess the multivariable influence of baseline characteristics and uptake of CHPI services on changes in sexual risk behavior.

Finally, we describe the security breach that occurred between baseline and the first follow-up visit. The study team handled the incident well and immediately notified other staff, the IRBs, and participants through peer educators. This had obvious impacts on our findings from Follow-up visit 1, which demonstrated longer duration between baseline and the first study visit. Overall, the experience demonstrates the challenges faced by MSM and staff working on related HIV prevention projects where homosexuality is criminalized. This study utilized several methods to protect participant confidentiality and privacy, which can be adopted by others working in stigmatizing settings. These included the use of verbal consent scripts, anonymous data collection, and peer recruitment (as opposed to study fliers). Peer educators utilized a 'flash' system for all contacts with participants; with this method peer educators call the participant and allow the number to ring once prior to hanging up. The participant recognizes the number and returns the peer educator's call when in a private

space. When concerns of safety arose, participants were reached immediately by peer educators and informed not to return to the site until further notice. Prior to and following the security breach, study team members were trained and retrained, respectively, on human subjects research and protection and on safety protocols. This study was able to regain momentum after the closure and had high retention throughout, speaking to the need for these services and the interest of MSM to use them in Blantyre.

These data serve as a demonstration of the potential benefits of providing CHPI to MSM in a challenging setting where same-sex practices are criminalized and/or where stigma significantly affects MSM. Given limited resources the CHPI program focused on provision of a combination of behavioral interventions. With demonstrated feasibility of the CHPI to provide services to and engage MSM in Malawi, future research and programming may leverage this model to include both behavioral and other proven biomedical prevention interventions, such as the use of PrEP and increased access to antiretroviral therapy for MSM living with HIV.³⁵⁻³⁷ Evidence of the role of perceived and experienced stigma against MSM and HIV infection highlight the urgency to develop and carefully implement combination HIV prevention programs for MSM in these settings.³⁸⁻⁴² The globally high and disproportionate burden of HIV among MSM underscores the need for consistent HIV prevention and care for MSM, even in challenging environments.^{2,43}

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Conceptual framework for the combination HIV prevention intervention for MSM in Malawi

Table 1

Demographic characteristics of MSM cohort participants of the CHPI study in Blantyre, Malawi 2012-13

Variable:	Categories:	Baseline participants enrolled in the cohort (N=103)
		% (n)
Age:	18-25 years	57.3 (59)
	26 years	42.7 (44)
Highest Level of Education (completed)	Less than Secondary	34.9 (36)
	Secondary or higher	65.1 (67)
Employment status:	Unemployed	44.6 (46)
	Employed	34.0 (35)
	Student	21.4 (22)
Gender Identity	Male	76.7 (79)
	Female	18.4 (19)
	Transgender	4.9 (5)
Sexual Orientation	Gay or homosexual	68.9 (71)
	Bisexual	30.1 (31)
	Heterosexual or straight	1.0 (1)
Marital Status (with a woman)	Married, Cohabiting	6.8 (7)
	Single /Divorced/ Separated	93.3 (96)
No. of children	None	91.2 (93)
	One or more	8.8 (9)

Table 2

CHPI participation and contact with peer educators over the course of intervention (2012-13)

Variable ¹	Categories	Follow-up 1 (N=95)	Follow-up 2 (N=89)	Follow-up 3 (N=96)	Test for trend ⁵
		%(n/N) ⁴	%(n/N) ⁴	%(n/N) ⁴	P-value
Median time (months) since last study visit ²		10	3	3	
Have you been to a (non-research related) health care provider like a nurse or doctor? ³	Yes	24.2(23/95)	32.6(29/89)	34.4(33/96)	0.13
Did your health care provider discuss how to have safe sex with male partners? (among those who visited a health provider during follow-up visit) ³	Yes	20.0(5/28)	23.8(5/21)	46.2(6/13)	0.07
Did your health care provider discuss mental health issues relating to being MSM? (among those who visited a health provider during follow-up visit) ³	Yes	3.8(1/26)	6.7(1/15)	18.2(2/11)	0.16
Did your health care provider discuss or test for anal STIs or oropharyngeal STIs (STIs in the throat)? (among those who visited a health provider during follow-up visit) ³	Yes	26.9(7/26)	42.1(8/19)	56.3(9/16)	0.06
Median number of contacts/meetings with peer educator (range)		1.5(0-10)	3(0-10)	3(0-15)	-
Did your peer educator give you condoms and lubricants? (among those who report meeting with peer educator during period prior to follow-up)	No	32.1(26/81)	12.5(11/88)	5.6(5/89)	<0.001
	Yes, condoms only	18.5(15/81)	25.0(22/88)	15.7(14/89)	
	Yes, lubricants only	16.1(13/81)	11.4(10/88)	7.9(7/89)	
	Yes, condoms and lube	33.3(27/81)	51.1(45/88)	70.8(63/89)	
Did your peer educator talk to you about HIV testing? (among those who report meeting with peer educator during period prior to follow-up)	Yes	69.2(54/78)	88.5(77/87)	81.6(71/87)	0.06
Did your peer educator talk to you about your sexual behavior? (among those who report meeting with peer educator during period prior to follow-up)	Yes	62.8(49/78)	89.7(78/87)	80.9(72/89)	P<0.01
Did your peer educator talk to you about your mental health, emotions, or depression? (among those who report meeting with peer educator during period prior to follow-up)	Yes	41.7(33/79)	74.4(64/86)	70.6(61/87)	<0.001
Do you think that your access to condoms and lubricants has changed as a result of participating in the CHPI study? (among those who report meeting with peer educator during period prior to follow-up)	Yes	53.2(50/94)	83.2(74/89)	92.7(89/96)	<0.001

¹ All question time periods are “since we last interviewed you.”² The study was interrupted between baseline and follow-up visit 1, accounting for the longer median time since last study visit

³ presented results were based on cumulative responses from period 1; results by follow-up period were not tested for trend as these questions were not asked at baseline but initiated with the intervention

⁴ Represents the number of cohort participants returning for each study visit

⁵ Nonparametric test for trend across ordered groups

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Table 3

Comparison of health, behaviors and knowledge among CHPI participant from baseline through follow-up in Blantyre, Malawi

Variable	Baseline (N=103)	Follow-up 1 (N=95) ¹	Follow-up 2 (N=89) ¹	Follow-up 3 (N=96) ¹	Test for trend ²
Health Status	% (n/N)	% (n/N)	% (n/N)	% (n/N)	p-value
New HIV diagnosis	0.0 (0/100)	7.6 (7/89)	0.0 (0/89)	0.0 (0/95)	NA
New Syphilis diagnosis	0.0 (0/ 100)	1.1 (1/92)	2.3 (2/88)	1.1 (1/95)	NA
Condom use					
Condom use in last sex with main male partner	62.5 (60/96)	79.3 (69/87)	81.2 (65/80)	77.0 (57/74)	0.02
Condom use in last sex with casual male partner	70.7 (53/73)	85.3 (64/75)	91.6 (61/71)	86.3 (63/73)	0.01
Lubricant use					
Water-based Lubricant use	28.9 (28/97)	49.5 (47/95)	63.6 (56/88)	74.0 (71/96)	< 0.001
Knowledge					
What type of sex puts you most at risk for HIV infection? <i>Anal</i>	13.1 (11/84)	30.5 (29/95)	33.0 (29/88)	37.9 (36/95)	<0.001
Which type of anal sex position puts you most at risk for HIV infection? <i>Receptive</i>	32.6 (32/98)	56.4 (53/94)	41.4 (36/87)	43.2 (41/95)	0.01
Which is the safest lubricant to use during anal sex <i>Water or silicone-based</i>	36.0 (32/89)	58.2 (53/91)	65.88 (56/85)	72.9 (70/96)	<0.001
Disclosure					
Have disclosed to family member as MSM ³	25.0 (25/100)	33.3 (31/93)	42.0 (37/88)	55.3 (52/94)	<0.01
Have disclosed to health care worker as MSM (among those who sought health care) ³	22.0 (22/100)	34.9 (22/63)	68.7 (22/32)	78.8 (26/33)	<0.001

¹ Represents the number of cohort participants returning for each study visit

² Nonparametric test for trend across ordered groups

³ presented results were based on cumulative responses across periods