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Implementation of HIV Prevention Interventions in Resource Limited Settings: The Partner Project

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Abstract Evidence-based HIV prevention interventions have been translated to a variety of contexts across sub-Saharan Africa. Non-specialized community health center (CHC) staff members have been successfully engaged to deliver the interventions, which can be integrated into pre-existing HIV service programs in community-based health care delivery sites. This manuscript describes the process of implementing the Partner Project, a couples HIV risk reduction intervention, and examines the ability of CHC staff to achieve risk reduction outcomes comparable to those of the highly-trained research staff. The Partner Project was implemented within the HIV Counseling and Testing program in 6 urban community health clinics in Lusaka, Zambia. One hundred ninety-seven HIV-seroconcordant and -discordant couples were sequentially enrolled to the control group or to receive the intervention from partner research or CHC staff members. Couple members completed assessments on condom use, alcohol use, and intimate partner violence (IPV) at baseline, 6, and 12 months follow-up. Sexual barrier use outcomes achieved by the CHC staff were comparable to or better than those achieved by the Partner Project research staff, and both were superior to the control group. A reduction in IPV was observed for the entire sample, although no change in alcohol use was observed. Implementation of HIV prevention interventions at the community level should take advantage of existing resources available within the CHC staff. This is especially relevant in resource limited settings as consideration of the financial and clinical requirements of intervention programs is essential to the achievement of successful program implementation.

Keywords HIV · Intervention · Couples · Translation · Sexual risk reduction

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Introduction

Evidence-based behavioral HIV prevention interventions have been translated, or culturally adapted, to a variety of contexts across sub-Saharan Africa [1, 2] to improve the practice of protective behaviors associated with reduced transmission [3, 4]. However, creative strategies are often necessary to successfully implement and sustain interventions in resource limited settings. For example, non-specialized community health center (CHC) staff members have been successfully engaged to deliver manualized counseling programs and behavioral interventions in Africa [5, 6]. Such interventions can be integrated into existing HIV counseling and testing (HCT) [7] and intimate partner violence (IPV) reduction service programs [8] in community-based health care delivery sites. To achieve sustainability, skill building workshops can be used to expand the scope of practice for existing CHC staff [9, 10]. In some settings, cadres of dedicated, certified community health workers have been established to be trained to implement interventions on a large scale [10–12].

Sub-Saharan African has the highest global prevalence of HIV and the utilization of interventions to reduce transmission between sexual partners is an essential component of efforts to curtail the epidemic. Additionally, extensive

research has shown that prevention efforts may be impeded by alcohol use and IPV in sub-Saharan Africa [13, 14]. In Zambia, over one million persons are living with HIV; the HIV prevalence is 20.8 % in the capital province of Lusaka [15], and most new infections are the result of heterosexual sex occurring in marital or cohabitating relationships [16]. Thus, Lusaka is an important target for implementing community-based interventions addressing sexual barrier use, alcohol use, and IPV among couples.

Publications from studies conducted over 16 years confirm the evidence base of the NOW/Partner program as an effective risk reduction intervention (see Fig. 1) [17]. The new opportunities for women (NOW) project, designed to reduce risk behavior among culturally diverse women living with HIV, was developed in 1997 and pilot-tested in the US in 1998 (Florida, New York, NJ, USA) [18]. The NOW project was adapted and pilot-tested in Zambia in 1999 [19], and in 2000, a large multi-site sexual risk reduction study began in academic hospital settings in the US and Zambia. In 2002, the Partner Project adapted NOW in Zambia to include men and to evaluate the relative impact of male partner involvement in the intervention on risk outcomes, including sexual barrier use, alcohol use and IPV [20]. Evidence of the effectiveness of the intervention among men using alcohol without an increase in IPV stimulated an expansion of the group-based program for HIV seropositive and serodiscordant couples in 2005 (NOW2) in the US [21] and in Zambia. Following a successful pilot translation of the Partner Project from the academic hospital setting to the "real-world" urban CHC setting in 2007 [7], the Partner Project 2 was implemented and carried out at six urban CHCs in Lusaka, Zambia from 2008 to 2013.

This manuscript describes the strategies utilized during the implementation process in this resource limited setting and the effectiveness of the intervention as a viable clinical service program for CHCs which could be conducted entirely by trained CHC staff. The principal study hypothesis compares the clinical outcomes achieved by the CHC staff with those achieved by the Partner Project research staff; it was theorized that utilizing a "train the trainer" model, CHC staff would learn to conduct the program and achieve risk reduction outcomes comparable to those of the Partner Project research staff, as well as train others to conduct the program (sustainability).

Methods

Prior to study onset, ethical review and approval was obtained from the University of Miami Miller School of Medicine Institutional Review Board and the University of Zambia research ethics committee. All participants provided written informed consent prior to enrollment.

The Partner Project was implemented within the existing CHC structure, which was comprised of CHC staff and Health Center Advisory Committees made up of community leaders drawn from neighborhood health committees representing the population in the clinic catchment area. Urban CHCs participating in the project served catchment areas from approximately 50,000 to over 100,000 persons and provided the majority of services for HIV prevention and care, i.e., HCT, prevention-of-mother-to-child transmission, medical male circumcision and distribution of antiretroviral therapy. CHCs also utilized an integrated program of "task shifting", the periodic redistribution of tasks to enhance efficient use of available staff [22–26], and relied on health committees to disseminate information to communities.

Site Selection and CHC Staff Recruitment

Partner Project study progress and outcomes were disseminated yearly from 2003 to 2007 through public forum presentations at the University of Zambia School of Medicine, the Lusaka Provincial Health Office and the Zambia CDC. In 2007, a summary of Partner Project outcomes and recommendations was developed and presented to the Ministry of Health and the Lusaka Provincial Health Office, and translation of the Partner Project to the CHC level began in 2007 with a survey to identify large clinics in urban Lusaka with adequate HIV seropositive patient census (minimum of 150 HIV seropositive or serodiscordant couples currently being seen at the site), to provide sufficient patients to meet recruitment goals.

Upon approval by the Lusaka Provincial Office, in 2008, the Lusaka District Health Office reviewed the clinics

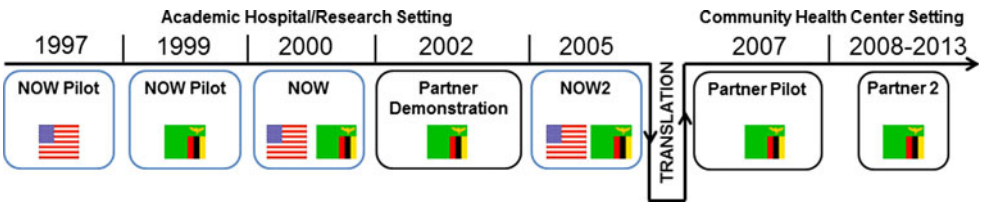

Fig. 1 Timeline of NOW/Partner studies

surveyed and selected six clinics for translation of the program. Meetings were held at each clinic with CHC Clinic Officers, Sisters in Charge and staff members to review Partner Project strategies and goals. Based on criteria outlined by the Partner Project regarding the duties associated with conducting the intervention [27], senior CHC staff selected those staff most appropriate for training as group leaders. Ongoing monthly meetings were conducted with Community Advisory Boards (CABs) at each clinic to facilitate community acceptance and uptake of the intervention across the duration of the study. The sequence of clinics offering the intervention was randomly determined; the first cohort recruited from each clinic excepting the first clinic was designated the control condition, and a new clinic began recruitment and provision of the intervention every 6 months.

CHC Staff Training

A 2-days training workshop was conducted to establish a cadre of group leaders from the selected clinics, and each year, clinics were provided with refresher training. Training was both didactic and conducted in small groups using hands-on practice-based strategies, and utilized a gender specific intervention manual with visual aids, condom demonstration models and male and female condoms. Following the workshop, CHC staff received "on the job" training from Research Project staff for two cohorts of participants at each CHC. The "train the trainer" model was used to ensure that CHC staff not only learned to conduct the program but learned to train others to do so, thereby enhancing the sustainability of the program.

Intervention sessions were first conducted with partner research staff as leaders and CHC staff as co-leaders. In the subsequent cohort, CHC staff led sessions and partner research staff served as co-leaders (see Fig. 2). Thereafter, CHC staff trained new group leaders, while partner research staff began sessions at new clinics or sat in on sessions for quality assurance. All CHC staff attending the training were compensated for travel and per diem, and received a modest stipend for providing the intervention.

Community Participant Recruitment

Recruitment for the intervention was integrated with the HCT program; clinic attendees were invited to participate in the study with their partner following HIV testing. Participants were serodiscordant and seroconcordant heterosexual couples, 18 years of age or older, sexually active within the last 30 days, and in a couple relationship for 6 months or more with at least one HIV seropositive member. Approximately 30 % of couples screened for enrollment were not eligible due to lack of 6 month "couple" status, lack of sexual activity within the previous month, or lack of at least one HIV seropositive couple member. Informed consent, assessments and the intervention were conducted in English, Nyanja or Bemba, the primary local languages in Lusaka; all staff were fluent in all three languages. Following provision of informed consent and enrollment, couple members completed a baseline assessment using audio computer assisted self-interview (ACASI). Participants attended four intervention sessions and were assessed at 6 and 12 months post intervention; compensation for time and travel expenses associated with assessments was provided (K50,000 Zambian Kwacha, US$10) but no compensation was provided for participation in the intervention. Those in the control condition completed only assessments and were given the opportunity to attend the intervention after the final assessment.

Measures

Sexual Diary

This questionnaire measured the use of sexual barriers during intercourse for each day of the week preceding assessment. A

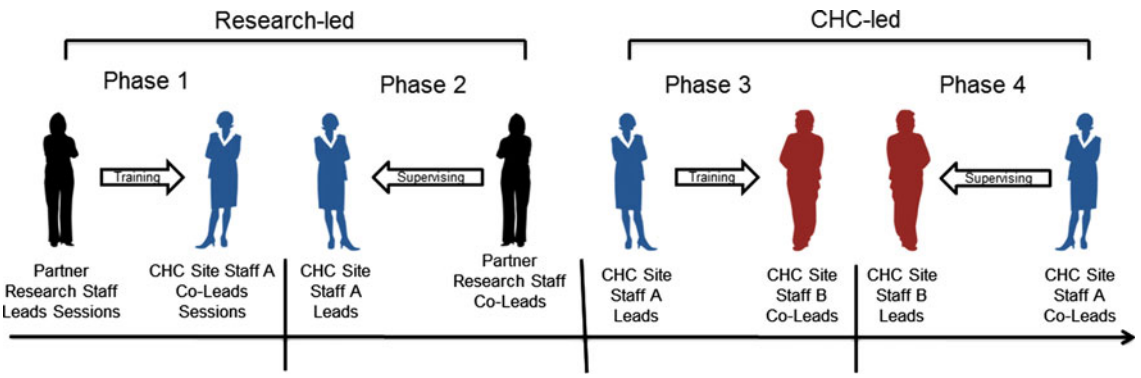

Fig. 2 The "train the trainer" model

pictorial representation of each sexual barrier product was presented, and participants indicated the type of sexual barrier method used, if any, during each day's sexual activities.

Intimate Partner Violence (IPV)

The conflict tactics scale [28] was used to assess IPV in two domains: violence (e.g., pushing, slapping) and extreme violence (e.g., assault, use of a weapon). Participants reported their experiences of IPV in the last month scored using a Likert scale of 0 (never), 1 (once), 2 (twice), 3 (3–5 times), 4 (6–10 times), 5 (11–20 times), or 6 (more than twenty times).

Alcohol Use Assessment

Use of alcohol was assessed using a 5 item questionnaire measuring the frequency and type of alcohol consumption in the week preceding assessment. "Bingeing," the consumption of 5 or more alcoholic drinks within a 24 h period, was also assessed.

Statistical Analyses

Preliminary analyses included descriptive statistics (e.g., mean, standard deviation, frequency) and bivariate comparisons between conditions (i.e., controls, partner RES-led vs. CHC-led) on demographic variables. If differences in demographic variables between conditions were noted, they were tested for association with outcome variables; if a significant association was found, these variables were controlled in multivariable analysis. Multivariable analyses were conducted using mixed models in order to account for the nonindependence between dyads at each time and within individuals over time; analyses also included random effects of clinics and cohorts within clinics. Models first included a full factorial combination of condition (i.e., control, Partner RES-led, CHC-led), gender, and time [i.e., baseline, midpoint (6 months), follow-up (12 months)] as independent variables. Interaction terms were removed, beginning with the least significant, until all remaining variables were significant, or only main effects remained. F tests of main and interaction effects were examined; if significant, comparisons between groups at each timepoint and timepoints within each group were made (as comparisons were planned, no adjustment for multiple comparisons was made). Because participants were sequentially enrolled and not randomized, analyses were restricted to those participants completing at least one assessment beyond baseline (i.e., those that completed a midpoint or follow-up assessment, or both). All analyses were conducted using SAS PROC GLIMMIX (SAS 9.3, SAS Corporation, Cary, NC, USA) at a two-tailed level of significance of $p = .05$.

Results

Demographics and Baseline Characteristics

On average, participants (n = 394 individuals, 197 couples) were 39 ± 8 years of age with 8 ± 3 years of education, and most were unemployed (n = 248, 63 %). The majority lived with their spouse/partner (n = 331, 84 %). Just over half of participants identified as Protestant (n = 203, 52 %), followed by Catholic (n = 133, 34 %) and other/no religion (n = 58, 15 %). Most participants had children (n = 360, 91 %), with an average of 3 ± 2 children. One-third (n = 131, 33 %) indicated that they or their partner was currently pregnant or was actively trying to become pregnant. Thirty-three participants were HIV negative (8 %), resulting in 33 couples (17 %) being HIV-serodiscordant (n = 361 HIV positive individuals, 164 HIV-seroconcordant couples, 83 %). Two-thirds of HIV positive participants were currently taking ARV medication (n = 240).

Demographics were examined by condition, overall, 150 participants (75 couples) attended the partner RES-led intervention, and 170 participants (85 couples) attended the CHC-led intervention. Seventy-four (37 couples) were control participants. Table 1 presents demographic information by condition.

Sexual Barrier Use

Sexual barrier use was assessed using a self-reported sexual diary of the past 7 days' sexual activities and barriers used. Participants were dichotomized as consistent condom users (i.e., 100 % of the time) or inconsistent condom users (less than 100 % of the time, including never). The proportions of consistent weekly condom use for each condition and time and standard errors are presented in Table 2.

Analyses of condom use revealed a significant condition by time interaction [$F(4,456) = 4.50$, $p = .001$], indicating that participants in the control condition did not change their weekly condom use over time. However, those in the RES-led group increased their condom use from baseline to midpoint ($p = .011$), but decreased from midpoint to follow-up ($p = .001$) such that baseline and follow-up did not differ ($p = .454$). Participants in the CHC-led condition showed no change in condom use from baseline to midpoint ($p = .687$), but increased condom use from midpoint to follow-up ($p = .024$), such that the improvement in condom use between baseline and follow-up was significant ($p = .001$). Examination of between-condition comparisons revealed no baseline or follow-up differences, but higher weekly condom use in the RES-led condition than both the control condition ($p = .003$) and the CHC-led condition ($p = .005$) at midpoint.

Table 1 Demographics

Characteristic	Control n = 74 n(%)/m(sd)	RES-led n = 150	CHC-led n = 170	F/X^2, p
Age	39.7 (8.7)	38.2 (7.7)	38.3 (7.1)	1.17, .311
Years of education	8.8 (3.1)	8.2 (3.3)	8.2 (3.1)	1.06, .348
Employment status				1.61, .446
Employed	25 (34)	52 (35)	69 (41)	
Unemployed	49 (66)	98 (65)	101 (59)	
Religion				5.61, .230
Protestant	40 (54)	85 (57)	78 (46)	
Catholic	25 (34)	48 (32)	60 (35)	
Other/not religious	9 (12)	17 (11)	32 (19)	
Living arrangement				0.08, .961
Live with partner	62 (84)	127 (85)	142 (84)	
Do not live with partner	12 (16)	23 (15)	28 (16)	
Number of children	4 (1.7)	3 (1.8)	3 (2.2)	2.95, .053
Pregnancy intentions				0.58, .750
Pregnant or trying to become pregnant	22 (30)	50 (33)	59 (33)	
Not pregnant or trying to become pregnant	52 (70)	100 (67)	111 (65)	
HIV status				0.68, .713
HIV positive	67 (91)	136 (91)	158 (93)	
HIV negative	7 (9)	14 (9)	12 (7)	
ARV status (n = 361 HIV positive)				3.44, .179
On ART	51 (76)	87 (64)	102 (65)	
Not on ART	16 (24)	49 (36)	56 (35)	

Table 2 Consistent condom use within 1 week preceding assessment

Condom use	Control proportion (SE)	RES-led	CHC-led
Baseline	0.39 (.08)	0.57 (.05)	0.49 (.05)
Midpoint	0.37 (.11)	0.75 (.05)	0.52 (.06)
Follow-up	0.50 (.09)	0.53 (.06)	0.68 (.06)

Alcohol Use

The use of alcohol was measured by self-reported consumption of 5 or more drinks within a 24 h period within the past week, defined as "bingeing". Table 3 presents the proportions of bingeing and associated standard errors for each condition and timepoint; analyses of alcohol use revealed no changes over time or differences between conditions. However, there was a significant main effect of gender [$F(2, 881) = 120.03$, $p < .001$], such that alcohol use was higher among men than women [mean (men) = 0.36, mean (women) = 0.06, $p < .001$].

Table 3 Consumption of 5 or more alcoholic drinks within a 24 h period within the week preceding assessment ("bingeing")

Alcohol use	Control proportion (SE)	RES-led	CHC-led
Baseline	0.13 (.04)	0.18 (.04)	0.14 (.03)
Midpoint	0.19 (.06)	0.17 (.03)	0.13 (.03)
Follow-up	0.24 (.06)	0.14 (.03)	0.13 (.03)

Table 4 Experience of IPV within 1 month preceding assessment

	Control proportion (SE)	RES-led	CHC-led
Violence			
Baseline	0.53 (.06)	0.55 (.04)	0.53 (.04)
Midpoint	0.53 (.07)	0.48 (.04)	0.48 (.04)
Follow-up	0.39 (.06)	0.38 (.04)	0.43 (.04)
Extreme violence			
Baseline	0.22 (.05)	0.26 (.04)	0.21 (.03)
Midpoint	0.24 (.07)	0.23 (.04)	0.22 (.04)
Follow-up	0.15 (.04)	0.20 (.04)	0.21 (.03)

Intimate Partner Violence (IPV)

Incidence of IPV was assessed across two types of violence: violence (e.g., slapping, pushing), and extreme violence (e.g., assault, use of a weapon). As the distributions of IPV variables demonstrated significant non-normality, participants were dichotomized into those who reported at least one act of violence or extreme violence in the past month and those who did not. The proportions of participants experiencing IPV for each condition and timepoint are presented in Table 4.

An effect of time was observed for violence [$F(2,885) = 8.87$, $p < .001$] that did not interact with condition, such that although participants did not report significant reductions in violence from baseline to midpoint, violence decreased from midpoint to follow-up ($p = .005$), which resulted in a decrease from baseline to follow-up ($p < .001$). Extreme violence did not differ between conditions or change over time, however, there was a significant gender effect [$F(1, 884) = 13.2$, $p < .001$], such that women reported experiencing more extreme violence than men [mean (men) = 0.17, mean (women) = 0.27, $p < .001$].

HIV Seroconversion

Of the 33 participants who tested HIV at baseline, 29 were re-tested at 12 month follow-up. Eight participants had

seroconverted (28 %), 5 men and 3 women; of these, 1 of 7 control participants (14 %), 5 of 12 RES-led participants (42 %), and 2 of 10 CHC-led participants (20 %) seroconverted. The small sample size precluded statistical testing (see Table 5).

Fidelity of Intervention Implementation

Regular reports derived from clinic data and qualitative summaries were provided to track the implementation progress. Quality assurance was assessed at all clinics among the first four cohorts of participants attending the intervention using a random sample (10 %) of audio-recorded sessions from each clinic. Recordings were reviewed and rated using a checklist to evaluate the provision of key intervention elements in each of the sessions. Ratings indicated that in cohort 2, the first CHC-led cohort, providers delivered 90 % of intervention elements, and in cohorts 3 and 4, the CHC-led and co-led cohort, providers delivered 75 % of intervention elements [27]. Periodic visits and regular conference calls were held with all sites to guide strategies to enhance sustainability, and a refresher workshop was held yearly to enhance fidelity of intervention delivery. Long term provider retention was assessed 2 years post-workshop training; 74 % of facilitators were retained and 21 % of the original facilitators continued to provide the intervention. One of the six clinics was disbanded after 2 years; of the remaining five clinics, all continued to provide the intervention with original or subsequently trained facilitators. The majority of facilitators led two or more interventions and led an additional cohort, training a second facilitator.

Discussion

This paper describes the process of implementation and examines the impact of a behavioral risk reduction intervention in a resource limited setting as a viable community-based clinical service program for CHCs. Results suggest that sexual barrier use outcomes achieved by the CHC staff were comparable or better than those achieved by the Partner Project research staff. Additionally, a reduction in IPV was observed for the entire sample, although no change in alcohol use was observed. Study outcomes support the use of the intervention in the urban Zambian community to increase consistent condom use without increasing IPV, including among those participants engaging in alcohol binges. Especially notable are maintained increases in condom use given previous research with seroconcordant couples, where study participants were less likely to use sexual barriers [29, 30]. However, conclusions regarding the efficacy of the intervention to reduce HIV transmission are limited by the small number of serodiscordant couples participating.

Participants in the CHC-led condition increased and maintained consistent condom use, in contrast with those in the research-led condition, who did not maintain midpoint gains at long-term follow-up. The familiar relationship that study participants had with the CHC staff members leading groups may have encouraged the sustained increase in following the 1 month intervention, in contrast to the research-led condition. Research group study outcomes are consistent with those found by many previous intervention studies of sexual risk behavior indicating that sustained change in behavior can be difficult to achieve [31]. Additionally, a reduction in IPV was observed among the entire sample. Reducing IPV, which inhibits discussion about HIV testing [32], serostatus disclosure [33, 34], and condom use [13, 14] should be an essential component of HIV prevention services. Sexual barrier use and IPV results suggest that clinic staff members with moderate training and supervision can not only deliver interventions with acceptable degrees of fidelity to protocol, but may even encourage better or sustained behavior change. However, similar to previous research in this population, the intervention did not impact alcohol use [1, 35, 36]. Due to the consistent association between alcohol use, IPV, and sexual risk behavior [13, 14], further research in this area is needed.

Although outcomes of this study were more modest than those achieved in previous studies utilizing the NOW/Partner intervention, the primary aim was to assess "real-world" effectiveness as opposed to research-setting efficacy. Participants were recruited based only on criteria of serostatus, relationship and sexual activity (i.e., couple status, at least one member of the couple being HIV positive, recent sexual activity) and were not compensated for participation in the intervention. Additionally, the intervention was delivered as an integrated element of the counseling and testing process. In Zambia, where only 22.8 % of the population aged 15–49 has been tested for HIV [37], the results of prevention interventions may be more dramatic among the untested and single population, who may be engaging in more risky behaviors. However,

Table 5 HIV seroconversions

	Control	RES-led	CHC-led
Baseline			
HIV negative, n = 29[a]	7	12	10
Follow-up			
HIV negative	6	7	8
HIV seroconversion (%)	1 (14)	5 (42)	2 (20)

[a] Of the 33 participants who tested HIV at baseline, 29 were re-tested at 12 months follow-up

integration of the intervention into an ongoing service program in community health clinics may increase its feasibility and sustainability.

Conclusions

The process of implementation and ensuring fidelity and sustainability of interventions in "real-world" settings requires a significantly different approach from the tightly-controlled research-setting. Community involvement, such as the integration of CABs into this study, may be beneficial for promoting and increasing acceptability and integration of programs in ongoing service delivery. Fidelity of interventions may be strengthened by the use of intervention manuals as well as ongoing supervision and quality control, and sustainability may be enhanced by the use of the "train the trainer" model. Most importantly, as this study illustrates, implementation of HIV prevention interventions at the community level can, and should, take advantage of the existing resources available within the CHC staff. This is especially relevant in resource limited settings as consideration of the financial and clinical requirements of intervention programs is essential to the achievement of successful program implementation.

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Conflict of interest The authors have no conflicts of interest to disclose.

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