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Peer Group Intervention for HIV Prevention among Health Workers in Chile

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Abstract

We tested the impacts of a professionally assisted peer group intervention on Chilean health workers' HIV-related knowledge, attitudes, and behaviors using a quasi-experimental design with a pretest and 3-month posttest. Two Santiago suburbs were randomly assigned to the intervention or delayed intervention control condition, and five community clinics per suburb participated. Interested workers at the intervention ($n = 262$) and control ($n = 293$) clinics participated and completed both evaluations. At posttest, intervention clinic workers had higher knowledge and more positive attitudes regarding HIV, condoms, stigmatization, and self-efficacy for prevention. They reported more partner discussion about safer sex, less unprotected sex, and more involvement in HIV prevention activities in the clinic and the community, but they did not report fewer sexual partners or more standard precautions behaviors. Because of these positive impacts, the program will become a regular continuing education unit that can be used to meet health worker licensing requirements.

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Keywords

Chile; communicable disease prevention; healthcare; HIV; peer group intervention

HIV is a serious public health problem in Chile and other Latin American countries. World Health Organization (WHO) reports a decline in global new HIV infections, but this decline is not apparent in Chile or other Latin American countries (Joint United Nations Programme on HIV/AIDS and World Health Organization [UNAIDS], 2010). Indeed, the number of new HIV infections continues to rise in Chile, reflecting the limited effectiveness of public health prevention strategies (Chilean Ministry of Health [MINSAL], 2009). In 2008, HIV prevalence for Chilean adults ages 15-49 was 3 per 1,000, with an estimated 31,000 persons living with HIV (PLWH), an increase from 25,000 in 2001 (UNAIDS, 2010). The actual extent of the epidemic may be even more serious because estimation is difficult due to low HIV testing rates and the lack of updated government information or a central registry consolidating HIV testing and follow-up information (MINSAL, 2009). Sexual transmission is the primary route of transmission in Chile, where an estimated 94.1% of all PLWH contracted the infection through sexual contact. The HIV epidemic in Chile began among adult males in the gay community, but new infections increasingly occur among the general population, especially socio-economically disadvantaged groups, women, and younger people (MINSAL, 2009).

Health workers can make a key contribution to more effective national HIV prevention efforts in Chile and other countries (Rotheram-Borus, Swendeman, & Chovnick, 2009). Health workers need to know how to protect themselves in their personal lives and at work. They also have unique opportunities to engage in HIV prevention teaching and to serve as role models because they command respect as authoritative sources of health promotion information in the communities where they work and live (Rahlenbeck, 2004; Talashek et al., 2007; Tarwireyi & Majoko, 2003). In Chile, community clinic workers are important gatekeepers because patients must be referred from these clinics to access testing and treatment for HIV and other sexually transmitted infections. Consistent use of standard precautions by health workers can minimize HIV transmission in the health care setting, promoting safety for both health workers and the clients and families they serve. However, there have been no published reports of efforts to train Chilean health workers regarding HIV. In this paper, we describe a professionally facilitated peer group intervention for HIV prevention community health workers in Chile and report on its impact on workers' HIV-related knowledge, attitudes, and behaviors.

Chilean Health Workers' HIV Prevention Needs

While there is not a large body of research on health workers, the existing evidence documents that health workers in most countries are not prepared to serve as HIV prevention leaders. Health workers' lack of knowledge has been documented in Latin America (Andrewin & Chien, 2008; Massiah et al., 2004) as well as in both industrialized and low-resource countries in other parts of the world (Gamazina et al., 2009; Rahlenbeck, 2004; Reis et al., 2005; Wu et al., 2002). These same studies also found that health workers express stigmatizing attitudes toward PLWH, including negative judgments about the moral worth of persons living with HIV, rejection, and unwarranted fear of contagion. Health workers also reported that the stigmatizing attitudes of their coworkers made them reluctant to be tested personally or to disclose their serostatus (Dieleman et al., 2007; Kiragu et al., 2007; Mahendra et al., 2007; Tarwireyi & Majoko, 2003). Health workers' inadequate knowledge has been explicitly linked to more stigmatizing attitudes toward PLWH among health workers (Gamazina et al., 2009; Mahendra et al., 2007; Rahlenbeck, 2004; Wu et al.,

2002). However, a large meta-analysis of general population studies in more than 20 countries found that stigmatizing attitudes persisted despite moderate to high knowledge levels, suggesting that increasing knowledge will only partially address the issue of stigma by health workers (Albarracin et al., 2005).

Studies have also identified disrespectful behaviors toward clients, inadequate teaching and counseling, and inconsistent use of standard precautions, often related to inadequate knowledge and stigmatizing attitudes (Mahendra et al., 2007; Rahlenbeck, 2004; Reis et al., 2005; Talashek et al., 2007). Health workers themselves have stated that they are reluctant to talk with clients about HIV, safer sex, or drug use due to fears of incorrect knowledge (Rahlenbeck, 2004; Reis et al., 2005). While the personal HIV risk behaviors of workers have been less studied, the limited evidence suggests that many health workers engage in behaviors that put them at risk (Kiragu et al., 2007; Wu et al., 2002).

The few studies of health workers in Chile indicate that they have these same limitations. Two studies have found inadequate knowledge related to transmission of HIV and legal protections for PLWH among Chilean health workers at secondary and tertiary level facilities (Araya et al., 2008; Suazo & Succo, 2003). As part of the formative evaluation that preceded this intervention, we found that community clinic workers expressed stigmatizing attitudes toward PLWH (Cianelli et al., in press) and did not consistently use standard precautions (Ferrer et al., 2009). Chilean health workers' inadequate knowledge and fear of HIV transmission also contribute to numerous situations of discrimination and loss of confidentiality that PLWH say have undermined their trust in the capacity of the health system to provide acceptable care (Vidal, Zorrilla, Donoso, Hevia, & Pascal, 2002).

HIV Prevention Interventions for Health Workers

Although nearly all health care systems have provided at least some HIV prevention training for health workers, few of these efforts have been the subject of published scientific evaluation. In many countries, studies evaluating training have consistently found that health workers benefited from training on HIV, counseling, and other topics (Burr, Storm, & Gross, 2006; Gamazina et al., 2009; Wu et al., 2002). Clients may also indirectly benefit when health workers' HIV prevention teaching abilities are strengthened and their stigmatizing attitudes are reduced. However, there is evidence that health workers in many countries continue to feel unprepared for the work they are expected to do. For example, in one study only about half of the Ugandan hospital workers questioned said they were trained for all the HIV-related tasks they were expected to perform (Dieleman et al., 2007).

Recent meta-analyses have shown that the active learning strategies of peer group interventions for HIV prevention, based on the social cognitive learning and related behavioral change theories, have been successful in promoting change in both high and low prevalence countries (Albarracin et al., 2005; Medley, Kennedy, O'Reilly, & Sweat, 2009). A peer approach to HIV prevention also has been effective in Latin America, Mexico, and for Mexican-Americans in the United States (Albarracin, Albarracin & Durantini, 2008; Peragallo et al., 2005). A recent meta-analysis found that intervention with predominantly Latino or Latin American participants were more effective when peer facilitators were used (Albarracin et al., 2008). However, for studies with predominantly non-Latin populations expert leaders were more effective. A study in Italy found no difference between a teacher led and a peer led HIV prevention intervention for high school students (Borgia, Marinacci, Schifano, & Perucci, 2005).

Peer interventions emphasize changing norms and building self-efficacy or confidence to perform behaviors as important in fostering changes in behavior. Peer leader interventions train existing social network leaders to provide informal instruction and support for HIV

prevention, while peer groups participate in a series of semi-structured sessions facilitated by trained members of the target group. Peer groups use skill-building, rehearsal with feedback, group support, and values clarification discussions to develop new group norms and reinforce behavioral skills. Peer interventions have been widely used in the workplace, and appear to have been successful despite limitations in their evaluation (Mahajan, Colvin, Rudatsikira, & Ettl, 2007). However there are few published studies of peer group interventions for health workers, and an extensive literature review did not locate any such studies for Chilean health workers.

The U.S.-based coauthors and their colleagues in Malawi have developed and tested a peer group intervention in Malawi that improved health workers' personal and work-related knowledge, attitudes, and behaviors (Chimango et al., 2009; Jere et al., 2010; Kaponda et al., 2009, Mbeba et al., 2011). The intervention's delivery was based on the WHO primary health care model of health worker-community collaboration to address health issues. Using the primary health care model to deliver the intervention is appropriate because Chile has a primary health care system.

The peer group intervention's content and participatory skill-building activities were guided by an integrated behavioral change model developed at a National Institute of Mental Health (NIMH) consensus-building conference, which incorporates elements of the health beliefs model, the theory of reasoned action/planned behavior, and social-cognitive learning theory (Rotheram-Borus et al., 2009). Increasing knowledge, positive attitudes, and social norms supporting behavior change is common to these behavioral change theories (Albarracin et al., 2005; Rotheram-Borus et al., 2009). An additional key element taken from Bandura's (1986) social-cognitive learning theory is the building of self-efficacy, or confidence in one's ability to perform the behavior, through behavioral rehearsal, role modeling, and support.

The intervention tested in this study, *Mano a Mano para Trabajadores de Salud* (Hand-to-hand for Health Workers), was adapted from the Malawi intervention and used the same conceptual framework. Based on a formative evaluation using interviews with managers, focus groups with workers, and clinic observations (Cianelli et al., in press; Ferrer et al., 2009), we tailored the intervention to the health system and cultural context of Chile. We modified the facilitation of the peer groups from a group member volunteer model to a professionally-assisted peer group model. The professionally assisted peer group model is congruent with the deeply held value of *respeto* in Latino culture, which places a high value on learning from a respected authority (Andrés-Hyman, Ortiz, Añez, Paris, & Davidson, 2006; Peragallo et al., 2005).

This study reports the impacts of this professionally-assisted peer group intervention on HIV knowledge, attitudes, and behaviors for Chilean community clinic health workers. We tested the hypothesis that, compared to a delayed intervention control group, health workers who received the intervention would have greater knowledge of general HIV transmission and standard precautions; more positive attitudes, including less stigmatization of PLWH, more positive attitudes toward stigma, and higher self-efficacy for safer sex and prevention at work and in the community; and more HIV prevention behaviors including more partner communication regarding safer sex, fewer partners, and more condom use, community HIV prevention activities, glove-wearing, hand washing, and HIV prevention activities at work.

Materials and Methods

We used a two-group quasi-experimental design to evaluate the effects of the intervention. Outcomes were evaluated at baseline and 3 months after the intervention.

Site and Sample

Chile's health system includes a national health service and private facilities, with most workers insured through their employers. This study was conducted with health workers at public health clinics serving mainly working poor families who paid for services on a sliding scale. The study site was in the southeastern Santiago metropolitan area, where a quarter of Santiago's population resides. The area has the highest rates of poverty, delinquency, illiteracy, and PLWH in the Santiago metropolitan area (Servicio Salud Metropolitano Sur Oriente, 2007). We first selected two of the municipalities (local administrative units) that were representative of the area and similar in terms of social, economic, and educational characteristics based on recommendations of experts from the Chilean Ministry of Health and the local public health service. After agreeing to participate, the two municipalities were randomly assigned to the intervention condition or to the delayed intervention control group.

We selected five community clinics in each municipality for inclusion in the study, 10 clinics in total. These community clinics provide primary care services to the surrounding population, including prenatal and well child care and adult care for illnesses and injuries. Cases requiring secondary or tertiary care are referred to a network of other facilities. The clinics do not provide treatment for sexually transmitted infections, HIV testing, or ongoing care for HIV infection. These clients are referred to a specialty clinic.

The participants were community clinic workers from the selected clinics. Community clinic workers were defined as those clinical and non-clinical workers employed directly by the clinic for more than 22 hours per week. We excluded workers employed by another company who had a subcontract with the clinic to supply ancillary services such as cleaning and security. Using the clinic employee roster, we sent each eligible worker a personal letter of invitation explaining the study and inviting them to participate in the study, followed by a telephone call at work. A total of 720 health workers agreed to participate (response rate = 82.9%), 356 were from the intervention municipality and 364 were from the control community. Of the 720 health workers who initially agreed to participate, 555 workers (77%) completed both questionnaires and comprise the evaluation sample.

The community clinic workers had a mean age of around 40 years; more than three quarters were female; most were married; and more than two thirds identified themselves as Roman Catholic (Table 1). The sample workforce in the control clinics had a significantly greater proportion of professionals and technicians (e.g., midwives, nurses, doctors, dentists, nutritionists, psychologists, and social workers). Compared to the intervention clinics, workers in the control clinics were significantly younger and had more education and higher income. There were no significant differences between intervention and control clinics on other demographic variables. In multivariate analyses of the impact of the intervention on final outcomes, we controlled for these baseline differences in age, job, education, and income as well as baseline values of that outcome.

Intervention

The intervention, *Mano a Mano Para Trabajadores de Salud*, is a professionally-assisted peer group intervention adapted from a peer group intervention successfully used for health workers in Malawi (Chimango et al., 2009; Mbeba et al., in press). The intervention's conceptual framework and cultural tailoring to Chile based on a formative evaluation were described above. We shortened the health worker intervention from the 10 sessions used in Malawi to only 8 sessions. In the Malawi research, the health workers were being prepared as community leaders; because the Chile workers did not plan to do this we were able to reduce content related to HIV prevention in the community. The eight sessions covered (a) the importance of community HIV prevention; (b) standard precautions in the health care

setting; (c) HIV testing treatment in Chile; (d) offering care that respects human dignity and confidentiality; (e) human sexuality, sexual transmission of HIV and other STIs, and HIV transmission through drug use and blood; (f) partner communication and HIV prevention; (g) counseling about HIV infection; and (h) teaching HIV prevention to clients and families. Each session incorporated active learning activities such as role plays, which we developed using situations and concerns that emerged in the formative evaluation.

To prevent interruptions, we held the sessions at a location separate from the clinic (an available classroom at the university) during the afternoon when the clinic was less busy. Groups included 10-12 participants, and as much as possible we had separate groups for the more educated professionals and the less educated paraprofessionals and ancillary staff. We provided transportation to and from the training site. Sessions lasted about 90 minutes. Refreshments were served at the end of each session. At the last session, the participants all received certificates.

Procedure

Ethical approval was obtained from the institutional review boards at both universities. We conducted the study in five successive cohorts, at one intervention clinic and one control clinic at a time. After health workers agreed to participate, a member of the research team went over the study in detail, answered questions, and obtained signed informed consent. The research team member gave the participant a self-administered baseline questionnaire, which the participant completed and placed in a sealed envelope coded by participant number. A member of the research team collected the completed questionnaires from the clinic every day. Only the research team coordinator had access to the list matching participant names and numbers, which was stored in a locked drawer at the Chile study office.

Then the research staff provided the intervention to the workers from the intervention clinics. This was coordinated from the Municipality with assistance from the directors of the health care centers. Only one person did not finish all the sessions, missing the last one. Three months after the intervention sessions were completed, the participants at both intervention and control clinics were contacted and given the final self-administered questionnaire, using the same procedures to ensure confidentiality. Then the intervention was offered to interested participants at the delayed control clinics using the same collaborative procedures. A total of 177 health workers from the control clinics received the intervention.

Variables and Operational Measures

We measured general HIV knowledge using a 25-item index, scored as percent correct (Table 2). Knowledge of Prevention ABCs (abstain, be faithful and/or reduce partners, and use condoms) was measured using a single question on what would help a person prevent HIV. Respondents received one point for each of the three prevention method strategies mentioned. Standard precautions knowledge was measured using correct responses to clinic situations for four subscales: glove use, hand washing, cleaning procedures, and handling of sharps. These four subscales were weighted equally to obtain an overall scale. All standard precautions knowledge indices were scored as percent correct.

We examined seven HIV-related attitudes. We asked health workers to evaluate the HIV training of health workers in Chile on a 7-point scale from low to high. We examined two aspects of stigmatizing attitudes about PLWH: acceptance of public contact and acceptance of client contact in the clinic. The reliability coefficient for public contact was only .55, but we report this variable since it has been included in many other studies. Reliability for the

client contact items created for this study based on the formative evaluation was acceptably high ($\alpha = .72$). The condom attitudes scale included 10 items, scored as the percent of the items expressing positive attitudes ($\alpha = .81$). We examined self-efficacy for three different areas of behavior: personal safer sex, community prevention activities, and teaching clients about HIV. All three of these measures had high reliability, ranging from $\alpha = .72$ to $\alpha = .78$.

We also asked about personal, community and workplace HIV prevention behaviors. Personal and community behaviors were asked about for the previous 3 months. Personal behaviors included: number of safer sex topics discussed with partner, number of sexual partners, and whether the person had unprotected sexual relations (e.g., sexual relations without a condom). To assess involvement in community activities, we asked whether the health worker had done any of 16 activities such as talking with friends or neighbors, scored as the total number of activities. We asked about three aspects of HIV prevention at work in the last month: how often the worker used gloves when needed, how often s/he washed hands when needed, and if s/he had done any HIV prevention activity at work. The worker self-defined what an "HIV prevention activity" was, so the activity might involve more use of standard precautions, more teaching to clients about HIV prevention or testing, or both.

Analysis

The data from the baseline and the 3-month post-intervention questionnaires were entered into SPSS with 100% verification of the data entry. All data were entered by the Chilean co-investigators and two research assistants, who were trained in data entry by the project statistician (K. Crittenden) and supervised by the project manager (L. Ferrer). We examined baseline characteristics of those who completed both the baseline and the 3-month questionnaires with those who completed only the baseline. Because there were no significant differences between those who dropped out and those who were retained, we conducted outcome analyses only for those workers who completed the 3-month evaluation. We compared the intervention and control groups at baseline and at the 3-month post-intervention evaluation using means and t-tests. We then estimated regression equations for each outcome at 3-months post-intervention, controlling for age (continuous), education (if technical school or university), income (continuous), job level (if technical or professional), and the baseline level for that outcome measures. All analyses were conducted using SPSS-Version 17.

Results

Knowledge

At baseline, health workers from both municipalities had reasonably high factual knowledge of HIV prevention (see Table 3). They had a mean score of over 70% correct on the general knowledge index, identified slightly over 2.5 of the three ABCs for prevention of sexual transmission prevention strategies, and had a mean score over 80% correct for overall standard precautions knowledge. Health workers in the intervention group had significantly lower baseline general and standard precautions knowledge scores.

At 3-months after the intervention, the health workers in the intervention group had significantly higher knowledge index scores than the control group and named more HIV prevention strategies. Intervention health workers also had significantly higher overall knowledge of standard precautions as well as knowledge of needle disposal and cleaning. When we used multiple regression to control for background characteristics and baseline scores, all knowledge measures, including the standard precautions total score and all four sub-scores, were significantly higher for the intervention group compared to the control group (See Table 3, last four columns).

Attitudes

At baseline health workers did not differ in how well trained about HIV they thought Chilean health workers were or in the two measures of stigmatizing attitudes, public contact stigma, and client contact stigma. The intervention clinic workers had significantly more negative condom attitudes and lower self-efficacy for safer sex, and there were no baseline differences in self-efficacy for community or workplace prevention (Table 4).

At 3-months post intervention, all attitude measures, except condom attitudes, were significantly more favorable for the intervention group before controlling for baseline levels and demographic factors. In regression analyses controlling for baseline levels, age, job, education, and income, the health workers who received the intervention had significantly more positive attitudes for all attitudinal measures, including a more positive ranking of health worker training about HIV, less stigmatizing attitudes toward general contact with PLWH and patient contact, more positive attitudes about condoms, and higher self-efficacy for personal safer sex, community prevention, and workplace prevention (See Table 4, last four columns).

Behaviors

At baseline, health workers in the intervention clinics were significantly less likely to report talking with their partners about HIV prevention (Table 5). Although they reported slightly fewer partners and less unprotected sex, these baseline differences were not significant. Reported community HIV prevention activities were significantly lower among intervention clinic health workers than control clinic workers at baseline. Regarding baseline behaviors in the workplace, the intervention health workers were slightly less likely than the control workers to report that they did one or more HIV prevention activity at work (27% vs. 33%), but the difference was not significant. Baseline reported hand washing and use of gloves were very high and did not differ for workers in the intervention and control clinics.

At 3-months post-intervention, the health workers in the intervention clinics reported slightly more discussion about safer sex with their partners and they reported significantly fewer sexual partners and less unprotected sex. In multiple regressions controlling for demographic factors and baseline levels of the variables, the intervention health workers reported significantly more discussion with their partner and less unprotected sex, but the difference in the number of partners reported was not significant (last four columns, Table 5). The intervention community health workers also reported participating in more community HIV prevention activities, and these differences were significant both in the comparisons of means and in the multiple regression analysis.

When we examined work-related behaviors, there was a small but significant difference in reported hand washing, with intervention health workers reporting more hand washing. However, neither hand washing nor glove wearing differed significantly at the final evaluation when demographic factors and baseline levels were controlled. The intervention health workers were significantly more likely to report at least one HIV prevention activity in the workplace (53.6% vs. 28.6%), and this difference remained significant in the multiple regression analysis. These activities were self-defined, so we cannot determine whether the worker increased use of standard precautions, more teaching to clients, more discussion with co-workers, or a combination of these.

Discussion

A theoretically based and culturally tailored peer group intervention for HIV prevention improved HIV-related knowledge, attitudes, and behaviors for community clinic health workers in Chile. Three months after the intervention when controlling for baseline levels

and demographic factors, health workers who received the intervention had higher knowledge regarding general HIV transmission and standard precautions, expressed more acceptance of contact with PLWH both in everyday life and in the clinic, and expressed greater self-efficacy to engage in personal safer sex, community HIV prevention activities, and HIV prevention in their work. The workers reported more discussion with their partners about safer sex and less unprotected sex, more involvement in community HIV prevention activities, and more HIV prevention activities during their work at the clinic. However, they did not report fewer sexual partners or more hand washing or glove wearing at work than health workers in the control clinic.

This study had several limitations. The evaluation used only self-reports, which are subject to social desirability bias, especially for sensitive behaviors such as risky sex and for behaviors such as glove wearing or hand washing where health workers “know” the right answer. The study of health workers in Malawi found that their reported hand washing and glove wearing did not change after the intervention, but observations before and after the intervention found significant improvement (Chimango et al., 2009; Jere et al., 2010). Unfortunately we did not have adequate resources to do observations in this study. Previous methodological reviews have concluded that self-reported behavior provides useful information despite systematic under-reporting, especially in studies with control groups where social desirability is likely to affect both intervention and control group responses (Plummer et al., 2004).

Another limitation is the generalizability of findings. Since all sites were community clinics where HIV testing and treatment are not done, their knowledge, attitudes, and behaviors may not be the same as those of health workers in the referral health facilities where more PLWH are cared for. Moreover, the impact of the intervention might not be the same for health workers in different settings. However, community clinic workers are important in their own right because they are gatekeepers who must recognize when clients need to be referred for testing or care.

Results of this study also are relevant for the theories guiding peer group interventions. Unlike most peer groups, this intervention was professionally assisted. The facilitators were nursing faculty so they were similar in that they were also health workers but they were different in that they had higher status and did not work in the same clinics. Mutual support from other group members, which is believed to be an important element of the peer group that fosters change, should be the same whether groups are facilitated by peers from the same group or by professionals. However, having a peer group facilitator who is a member of the same social group should make the facilitator a more persuasive role model. This professionally assisted peer group intervention in Chile achieved levels of change that were comparable to those experienced by clinic and hospital health workers in Malawi, who received a peer-led intervention with the same conceptual framework and highly similar content and skill-building activities (Chimango et al., 2009; Jere et al., 2010; Kaponda et al., 2009; Mbeba et al., 2011). A study in Italy found that teacher-led and peer-led HIV prevention programs were equally effective for high school students (Borgia et al., 2005). Thus, the limited evidence from these studies suggest that a professionally assisted peer group can be as effective as one led by trained peers. In contrast, a meta-analysis of peer group intervention studies found that when the study had primarily Latino or Latin American participants, peer leaders were more effective, somewhat different from our results. The meta-analysis also found that in studies with fewer Latinos or Latin Americans, expert facilitators were equally or more effective (Albarracin et al., 2008). Therefore, it appears that more research is needed to further identify under what conditions peer-led groups versus professionally assisted peer groups are more effective in promoting behavioral change.

Implications

The *Mano a Mano Para Trabajadores de Salud* intervention program can increase health workers' knowledge, develop more positive and less stigmatizing attitudes, and lead to safer personal behaviors and more involvement in HIV prevention in the workplace and the community. Thus, this intervention can prepare health care workers to contribute to the prevention of transmission of HIV in Chile. This program is part of the *Mano a Mano* HIV prevention program at the School of Nursing at Pontificia Universidad Católica de Chile to develop effective interventions to address prevention issues in Chile. Based on the positive impacts of the intervention for health workers, the municipalities plan to make the program a regular continuing education unit available for community health workers to use to fulfill the periodic continuing education required to maintain their licenses. The program is built on the existing primary health care system, allowing its scaling-up at a relatively low cost. The intervention should be made available for Chilean health workers as part of their initial training as well as their continuing education. It also provides a model that can be adapted to other countries in the region to prepare health care workers for HIV prevention.

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Table 1
Demographic Characteristics of Health Workers (N = 555)

	Control (n = 293)	Intervention (n = 262)	t	df
Age in years; <i>M (SD)</i>	37.7 (9.9)	41.7 (10.6)	4.52***	552
Education (% Technical College or University)	80.6	53.1	-7.10***	493
Occupation (% Professional or Technician)	39.9	26.3	-3.44***	553
Monthly Family Income (in thousands of CLP); <i>M (SD)</i>	613.1 (416.2)	445.2 (384.0)	-4.93***	548
Gender (% Female)	82.9	76.7	-1.82	526
Marital Status (% Married)	52.6	50.4	-.51	553
Religion (% Catholic)	74.1	69.5	-1.20	539

Note. *M* = mean; *SD* = standard deviation; *df* = degrees of freedom; CLP = Chilean pesos (1000 CLP = \$2.08 U.S.)

t-test significant, *p* < .001, 2-tailed

Table 2
Variables and Items

	Range	α^a
Knowledge		
<i>HIV Knowledge</i> : % correct, 25 items on HIV transmission, HIV and AIDS	0-100%	.67
<i>HIV ABC's Prevention</i> : # mentioned when asked how a person can prevent HIV	0-3	-
<i>Total Standard Precautions Knowledge</i> : Mean of 4 following variables	0-100%	-
<i>Glove Knowledge</i> : % correct, 21 items on using and changing gloves such as: contacting blood, starting IV, cleaning surface, emptying garbage, caring for deceased patient, cleaning floor, giving medication, giving food, feeding an HIV-infected patient, cleaning equipment	0-100%	-
<i>Hand Washing Knowledge</i> : % correct, 6 items such as before seeing patient, after touching blood, after contact with contaminated surfaces or equipment	0-100%	-
<i>Sharps Knowledge</i> : % correct, 2 items: Proper disposal of sharps (standard container); dispose of needles or recapped (not recapped)	0-100%	-
<i>Cleaning Knowledge</i> : % correct, 2 items: How often clean surfaces (after each patient), what should be used to clean surfaces (bleach or disinfectant)	0-100%	-
Attitudes		
<i>Rating of Health Worker Training for HIV and AIDS</i> : [1 = low; 7 = high]	1-7	-
<i>Public Contact Stigma</i> : mean of 3 items [1 = <i>Permitted</i> , 2 = <i>Don't Know</i> , 3 = <i>Not Permitted</i>] Person living with HIV should be permitted: in public places, to cook a family meal, to use toilet	1-3	.55
<i>Client Contact Stigma</i> : mean of 3 items [4 = <i>Very Uncomfortable</i> – 1 = <i>Completely Comfortable</i>] Having HIV patients in clinic, shaking hands, treating client with HIV	1-4	.73
<i>Condom Attitudes</i> : % positive to condoms of 10 items: sexual enjoyment for self & partner, 3 items; indicates promiscuity, 5 items; effective prevention, 2 items	0-100%	.81
<i>Self-efficacy for Safer Sex</i> : mean of 6 items [1 = <i>not confident</i> , 2 = <i>somewhat confident</i> , 3 = <i>very confident</i>] Can abstain if decide not to have sex, talk about safer sex with partner, get partner to agree to use condoms, refuse sex without a condom/ get condoms, use condoms correctly	1-3	.72
<i>Self-efficacy for Community Prevention</i> : mean of 4 items [1 = <i>Not Confident</i> , 2 = <i>Somewhat Confident</i> , 3 = <i>Very Confident</i>] Can talk about HIV prevention, safer sex with friends & relatives, own children	1-3	.78
<i>Self-efficacy for Prevention at Work</i> : mean of 3 items [1 = <i>not confident</i> , 2 = <i>somewhat confident</i> , 3 = <i>very confident</i>] Can talk with clients about HIV prevention, taking HIV test, counseling prior to HIV test	1-3	.76
Reported Behaviors		
<i>Partner Communication</i> : Sum of 3 items [1 = <i>Yes</i> , 0 = <i>No</i>] Talk with partner in last 3 months about safer sex, condoms, fidelity	0-3	-
<i>Number of Partners</i> : # of distinct partners in last 3 months	0-4	-
<i>Sex Without Condoms</i> : No use of condoms in last 3 months	0-1	-
<i>Community HIV Prevention</i> : # of 16 activities such as led discussion; talked prevention/safer sex with: partner, other adults, own children, other young people; contributed money or time	0-16	.82
<i>Glove Wearing</i> : mean of 9 items in last month [rated 1 = <i>seldom/never</i> , 2 = <i>< half</i> , 3 = <i>half</i> , 4 = <i>> half</i> , 5 = <i>always</i>] such as for contact with blood or bloody fluids, handling garbage, giving injection/IV, handling contaminated equipment	1-5	-

	Range	α^a
<i>Hand Washing</i> : mean of 7 items in last month [rated 1 = <i>seldom/never</i> , 2 = <i>< half</i> , 3 = <i>half</i> , 4 = <i>> half</i> , 5 = <i>always</i>] such as between patients, after contracting body secretions, before/after starting IV's, after contact with contaminated equipment	1-5	-
<i>HIV Prevention at Work</i> : Reported having engaged in an HIV prevention activity at work (self-defined by health worker) in the last 3 months (0 = <i>no</i> , 1 = <i>yes</i>)	0-1	-

Note. ABCs = Abstain, Be faithful/reduce partners, Condoms

^a Internal consistency coefficient, Cronbach *alpha* (α)

Table 3
Intervention Effects on Health Workers' HIV-Related Knowledge (N = 555)

	Comparison of Means or Per Cents between Intervention & Control										Multiple Regression (OLS) Coefficient for Intervention-Control ^a			
	Baseline					Final								
		Control (n = 293)	Intervention (n = 262)	t	df	Control (n = 293)	Intervention (n = 262)	t	df	B	Std. Error	t	df	
<i>HIV Knowledge</i>	%	74.6	71.9	-2.81**	553	76.3	83.3	7.56***	553	9.561	.764	12.52***	540	
<i>HIV ABCs Prevention</i>	M (SD)	2.56 (.54)	2.55 (.58)	.220	553	2.58 (.58)	2.74 (.52)	3.49***	553	.181	.048	3.80***	540	
<i>Standard Precautions Knowledge</i>	%	84.3	81.0	-2.36*	525	83.8	89.0	4.11***	553	7.796	1.158	6.73***	540	
<i>Glove Knowledge</i>	%	85.7	84.9	-.69	553	87.6	88.4	.56	550	2.131	1.309	1.63*	537	
<i>Hand Knowledge</i>	%	93.9	90.0	-2.19*	513	92.8	95.0	1.45	511	4.627	1.577	2.93**	540	
<i>Sharps Knowledge</i>	%	69.3	63.2	-2.06*	519	68.7	80.0	4.27***	551	.173	.022	7.07***	538	
<i>Cleaning Knowledge</i>	%	88.2	86.1	-1.03	532	87.3	92.8	2.89**	546	.050	.019	2.61**	539	

Note. M = mean; SD = standard deviation; df = degrees of freedom; ABCs = Abstain, Be faithful/reduce partners, Condoms

^a OLS (Ordinary Least Squares) Regression, controlling for baseline value of predicted variable and for age, education, occupation, and family income.

* $p < .05$, t -test of significance

** $p < .01$, t -test of significance

*** $p < .001$, t -test of significance

Table 4

Intervention Effects on Health Workers' HIV-Related Attitudes (N = 555)

	Comparison of Means or Per Cents between Intervention & Control								Multiple Regression (OLS) Coefficient for Intervention-Control ^a			
	Baseline				Final				B	Std. Error	t	df
		Control	Intervention	t	df	Control	Intervention	t				
		(n = 293)	(n = 262)			(n = 293)	(n = 262)					
<i>Rating of Health Worker HIV Training</i>	M (SD)	4.13 (1.46)	4.06 (1.73)	-.60	434	3.83 (1.46)	4.59 (1.55)	5.87***	.674	.138	4.88***	506
<i>Public Contact Stigma</i>	M (SD)	1.15 (.42)	1.19 (.49)	1.22	519	1.11 (.35)	1.04 (.26)	-2.63**	-.109	.027	-4.06***	540
<i>Client Contact Stigma</i>	M (SD)	1.88 (.61)	1.90 (.65)	.21	545	1.81 (.61)	1.53 (.53)	-5.78***	-.334	.043	-7.77***	528
<i>Condom Attitudes</i>	%	75.2	65.3	-4.54***	527	76.6	76.8	-.09	7.292	1.602	4.55***	540
<i>Self-efficacy for Safer Sex</i>	M (SD)	2.58 (.44)	2.48 (.44)	-2.58*	551	2.61 (.40)	2.68 (.37)	2.39*	.128	.032	4.06***	536
<i>Self-efficacy for Community Prevention</i>	M (SD)	2.68 (.40)	2.70 (.42)	.63	552	2.78 (.38)	2.87 (.28)	3.39***	1.06	.030	3.56***	516
<i>Self-efficacy for Prevention at Work</i>	M (SD)	2.49 (.56)	2.49 (.53)	.024	551	2.59 (.54)	2.72 (.40)	3.31***	.159	.039	4.12***	537

Note. M = mean; SD = standard deviation; df = degrees of freedom

^a OLS (Ordinary Least Squares) Regression, controlling for baseline value of predicted variable and for age, education, occupation, and family income.

* p < .05, t-test of significance

** p < .01, t-test of significance

*** p < .001, t-test of significance

Table 5

Intervention Effects on Health Workers' HIV-Related Behaviors (N = 555)

	Comparison of Means or Per Cents between Intervention & Control							Multiple Regression (OLS or Logistic) Coefficient for Intervention-Control ^a			
	Baseline				Final			B	Std. Error	t	df
		Control (n = 293)	Intervention (n = 262)	t	df	Control (n = 293)	Intervention (n = 262)				
<i>Partner Communication</i>	M (SD)	1.62 (1.19)	1.34 (1.20)	-2.69**	548	1.64 (1.23)	1.70 (1.27)	.234	1.00	2.33**	532
<i>Number of partners</i>	M (SD)	.88 (.49)	.80 (.56)	-1.59	508	.86 (.43)	.78 (.59)	-.032	.035	-.90	530
<i>Sex Without Condoms</i>	%	71.1	66.8	-1.00	527	73.2	60.9	-.840	.260	-3.24***	524
<i>Community HIV Prevention</i>	M (SD)	7.38 (3.73)	6.51 (3.67)	-4.00***	552	7.76 (3.75)	8.95 (3.22)	1.705	.213	7.99***	540
<i>HIV Prevention at Work</i>	%	33.4	27.2	-1.44	551	28.6	53.6	.331	.039	8.55***	536
<i>Glove Wearing</i>	M (SD)	4.61 (.73)	4.66 (.75)	.65	384	4.62 (.75)	4.76 (.59)	.096	.070	1.38	326
<i>Hand Washing</i>	M (SD)	4.78 (.50)	4.74 (.56)	-.82	433	4.81 (.45)	4.84 (.37)	.036	.044	.82	357

Note. M = mean; SD = standard deviation; df = degrees of freedom

^aOLS (Ordinary Least Squares) Regression, controlling for baseline value of predicted variable and for age, education, occupation, and family income.

* p < .05, t-test of significance

** p < .01, t-test of significance

*** p < .001, t-test of significance