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Impacts of a Peer-Group Intervention on HIV-Related Knowledge, Attitudes, and Personal Behaviors for Urban Hospital Workers in Malawi

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Abstract

This report describes the effects of a peer-group intervention on Malawian urban hospital workers' HIV-related personal knowledge, attitudes, and behaviors. More than 850 clinical and nonclinical hospital workers received the intervention. Evaluation used independent surveys of a sample of workers at baseline ($N = 366$) and *postintervention* ($N = 561$). Compared with the baseline survey, after the intervention, workers had higher knowledge of HIV transmission and prevention; more positive attitudes including more hope, less stigmatization of persons with HIV, more positive

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attitudes toward HIV testing and condom use, and higher self-efficacy for practicing safer sex and for community prevention; more reported recent personal HIV tests, more discussion of safer sex with partners, and more reported community HIV prevention activities. However, health workers' risky sexual behaviors did not differ at baseline and postintervention. The intervention should be strengthened to support more sexual risk reduction and be made available to all health workers in Malawi.

Keywords

attitudes; behavior change; health workers; HIV prevention; knowledge; Malawi; personal HIV risk

The continuing global HIV epidemic is a major health and socioeconomic issue affecting health workers in Malawi and other countries in southern Africa where HIV prevalence rates are among the highest in the world (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2008). Health workers are at risk of HIV infection from their personal behaviors as well as the smaller but real risk of occupational exposure to HIV. Well-informed health workers also have high potential to influence others because the general public regards them as accurate sources of health information. Relatively few HIV prevention interventions have been directed at health workers in Malawi, and their need for personal HIV prevention has been especially neglected. Thus, effective HIV prevention interventions for health workers are urgently needed. This report describes a peer-group intervention for HIV prevention offered to workers at an urban referral hospital in Malawi and its effects on their HIV prevention-related personal knowledge, attitudes, and behaviors. A subsequent report will describe impacts on work-related HIV prevention.

Background

Health Workers as HIV Prevention Leaders

Health workers are a key component in the continuing global struggle to contain the HIV epidemic, especially in Malawi and other countries in southern Africa. Although the epidemic seems to have stabilized in Malawi, about 14% of all adults ages 15 to 49 are currently living with HIV (UNAIDS, 2008). Health workers, like the overall population, are at risk of HIV infection. A study in South Africa reported that 15.7% of a representative sample of health workers were living with HIV (Shisana, Hall, Maluleke, Chauveau, & Schwabe, 2004). Although the degree of occupational risk is widely debated (Gisselquist & Potterat, 2004), most of these infections are likely to be the result of unprotected sex rather than occupational exposure. Health workers' high morbidity and mortality from HIV infection places a burden on the health care system (Garbus, 2003; Shisana et al., 2004) and exacerbates already severe staff shortages.

Health workers also are potential role models and sources of reliable HIV information for their relatives, friends, and neighbors because they are respected for their health knowledge (Rahlenbeck, 2004; Talashek et al., 2007; Tarwireyi & Majoko, 2003). Even health facility workers like guards and cooks, who are not directly involved in patient care, are often asked questions about HIV by their relatives and neighbors. If health workers receive HIV

prevention interventions so that they have a sound knowledge base, positive attitudes, and exemplary low-risk behaviors, they have high potential to be persuasive role models and sources of reliable HIV and AIDS information for their relatives, friends, and neighbors.

Health Workers' HIV Prevention Needs

Health workers in Africa have many HIV prevention needs. It is well-documented that health workers in African countries continue to have inadequate HIV prevention knowledge, stigmatizing attitudes, and risky personal behaviors (Adebajo, Bamgbala, & Oyediran, 2003; Dieleman et al., 2007; Ezedinachi et al., 2002; Rahlenbeck, 2004; Walusimbi & Okonsky, 2004). At least one study reported that more-educated workers had fewer knowledge deficits (Walusimbi & Okonsky, 2004).

Negative attitudes held by health workers include stigmatization of persons living with HIV; reluctance to discuss sexuality issues, especially with young people; and a sense of hopelessness about combating the epidemic (Adebajo et al., 2003; Rahlenbeck, 2004; Talashek et al., 2007; Walusimbi & Okonsky, 2004). Stigmatizing attitudes include negative judgments about the moral worth of persons living with HIV, rejection, and unwarranted fear of contagion. In several African studies, health workers who had greater knowledge also had less stigmatizing attitudes (Adebajo et al., 2003; Rahlenbeck, 2004; Walusimbi & Okonsky, 2004); however, one study in Nigeria reported that health workers continued to express stigmatizing beliefs despite moderate to high knowledge levels (Adebajo et al., 2003). Health workers have also expressed fear of the stigmatizing attitudes of their coworkers as well as the general public, making them reluctant to be tested or to disclose their serostatus (Dieleman et al., 2007; Tarwireyi & Majoko, 2003). Health workers' reluctance to discuss sexuality reflects traditional norms in many African countries that discourage open discussion about sexuality, especially with children (Fuglesang, 1997; Uwakwa, 2000). These cultural values can limit health workers' ability to be role models for others about prevention of sexual transmission of HIV. The ongoing HIV epidemic and deteriorating working conditions have made many health workers in African countries feel afraid, demoralized, and powerless to make positive changes (Dieleman et al., 2007; Walusimbi & Okonsky, 2004). The evidence shows that health workers in Africa need interventions to develop more comprehensive knowledge and more positive attitudes about discussion of sexual transmission, to decrease stigma associated with HIV, and to increase their hopefulness and self-efficacy for behavioral change.

In contrast to the many studies of health workers' knowledge and attitudes, there have been relatively few studies of health workers' HIV risk behaviors in their personal lives. In Rwanda, only 17% of health workers reported using condoms, with more frequent use among those reporting more than one partner in the last year (Rahlenbeck, 2004). A study of 692 health workers in five Zambian hospitals reported that only 60% believed condoms were effective, 26% reported multiple partners but only 37% of them had used condoms, and only a third of the health workers and a quarter of their spouses had been tested for HIV (Kiragu et al., 2007). A study of predominantly female student nurses in Zimbabwe reported that although female students reported little premarital or extramarital sex, male students reported much more premarital and extramarital sex. However, many female students were

at risk from their partner's behavior; one third suspected that their partner had other relationships (Verkuyt, 2000). In the authors' previous focus groups with health workers in Malawi, participants acknowledged that many health workers engaged in risky sexual behaviors and that their regular income marked them as desirable partners (Talashek et al., 2007).

In summary, health workers urgently need effective HIV prevention interventions to protect themselves and to serve as effective role models. Maximizing personal HIV risk reduction behaviors and their potential leadership activities should be a high priority in countries like Malawi.

Previous HIV Prevention Interventions for Health Workers

Many previous studies have documented that peer interventions have been among the most successful HIV prevention interventions in many countries, including those in Africa (Ezedinachi et al., 2002; Kebaatswe & Norr, 2002; Merson, Dayton, & O'Reilly, 2000; Norr, Norr, McElmurry, Tlou, & Moeti, 2004). Most peer-leader and peer-group interventions use a behavior change model that emphasizes building self-efficacy or confidence to perform a particular behavior as an essential precursor of behavioral change. Peer-leader interventions train existing leaders of particular social groups, who then provide informal instruction and support for HIV prevention. Peer groups are a series of structured meetings facilitated by a trained member of the target group. These groups develop self-efficacy for the desired behaviors through group support, changing group norms, role modeling, skill building, rehearsal, and performance appraisal. Many peer interventions have been implemented in workplaces. A recent review in Southern Africa reported that the majority of workplaces surveyed had an HIV prevention program in place, usually relying on peer leaders; although evaluations are limited and not scientifically rigorous, results seem to be positive (Mahajan, Colvin, Rudatsikira & Ettl, 2007).

Despite the evidence that peer interventions for HIV prevention can help workers reduce behaviors that put them at risk of HIV, there are no previous reports of using this behavioral change model to provide HIV prevention to health workers. Most countries have provided some HIV education for health workers, but this education has focused mainly on factual knowledge, and few published evaluations are available. Two interventions in Nigeria significantly improved health workers' HIV-related knowledge and attitudes (Ezedinachi et al., 2002; Uwakwa, 2000). Another study reported that mental health care providers in South Africa had more knowledge and felt more comfortable about HIV care after training (Collins, Mestry, Wainberg, Nzama, & Lindegger, 2006). A study in four hospitals in Uganda reported that only about half of the workers had been trained for all of the HIV-related tasks they were expected to perform, and none of the facilities offered a systematic program to help health workers deal with stress (Dieleman et al., 2007). Some African countries have trained selected health workers in voluntary counseling and testing and/or home-based care (Ezedinachi et al., 2002; McCreary, Mkhonta, Popovich, Dresden, & Mndebele, 2004), but in most countries, health workers have received mainly factual information. Lower-level health workers and nonclinical workers in health facilities generally receive little or no HIV prevention training in Malawi or in many other countries.

Providing effective, evidence-based HIV prevention interventions for health workers is likely to be highly cost effective. However, no African country to date has trained health workers specifically to address their own risks for HIV infection because of personal behaviors or to be community leaders and role models for HIV prevention.

To address this gap, the research team has developed a peer-group intervention for health workers in Malawi. This intervention, called *Mzake ndi Mzake*, or Friend to Friend, is based on an earlier intervention that was originally used effectively for urban women in Botswana (Norr et al., 2004). The authors used formative evaluation to modify the intervention for primary school teachers in Malawi (Kachingwe, Norr, Kaponda, Norr, & Mbweza, 2005). The intervention was effective in producing short-term changes in knowledge, attitudes, and behaviors for primary school teachers attending the final stage of a distance-learning certification program (Norr, Norr, Kaponda, Kachingwe, & Mbweza, 2007).

The authors then focused on developing and testing an intervention for rural communities that took advantage of health workers' potential to be HIV prevention leaders (Norr et al., 2006). The intervention was based on an innovative conceptual framework that integrated the World Health Organization primary health care model, social-cognitive learning theory, and contextual tailoring. The intervention implementation strategy was built upon the primary health care model of health worker-community collaboration to achieve accessible, acceptable, and affordable health promotion (McElmurry & Keeney, 1999). To implement the intervention effectively, the authors engaged community and health system leaders and used trained volunteer health workers and community members as peer-group facilitators. The learning processes of the intervention were based on Bandura's (1989) social-cognitive learning theory, which focused on building self-efficacy or confidence through skill building and rehearsal with corrective feedback to foster behavioral change. Contextual tailoring made the intervention responsive to locally relevant barriers and needs (Dancy, 2003). The authors' formative evaluation with health workers (Talashek et al., 2007) further guided the specific content of the intervention. For Malawian health workers, this intervention was quite different from previous didactic training programs they had received. Health workers become engaged in the intervention through extensive participatory learning and skill-building content, peer-group facilitation by a coworker volunteer, and the opportunity to become a volunteer peer leader. The intervention also included both clinical and nonclinical workers at all levels, with content that was both accurate and accessible to less-educated workers.

Purpose

This study grew out of the authors' research to mobilize district health workers as HIV prevention leaders for rural communities described previously (Norr et al., 2006). The authors' work at a rural district hospital made them aware that urban hospital workers also needed an intervention that would help them become leaders in HIV prevention at their workplaces and in their communities. To address these problems, the authors implemented a peer-group intervention for HIV prevention with hospital workers in a large urban referral hospital in Malawi from 2004 to 2006 with funding from the World AIDS Foundation. The purpose of this report is to describe the impacts of the *Mzake ndi Mzake* peer-group

intervention on the HIV-related knowledge, attitudes, and personal behaviors of these urban hospital workers.

Method

The authors used a pre-post test design with no control group to evaluate the impacts of the intervention on urban hospital workers, using unmatched samples of health workers at each time period. There are only four large governmental referral hospitals in Malawi, and they are widely separated geographically to provide nationwide coverage. It was not feasible within budgetary constraints to use another referral hospital as a control group. At the referral hospital, all staff intermingled and discussed events at the work-place on a daily basis. Thus, randomizing units or individuals to the intervention or control group was not appropriate because of the threat of contamination of the control group. Also, the authors wanted to observe the impact of the intervention for the hospital as a whole, not just for individuals or designated units. Because the intervention took only 10 months to complete, when planning the project the authors hoped that changes resulting from relevant factors other than the intervention would be minimal. The stressful conditions at the hospital changed little over the course of the project, but the availability of HIV testing and drug treatment increased substantially at the hospital and other locales in Malawi.

Site and Sample

Malawi has a national health care system based on the World Health Organization primary health care model. Four governmental regional central hospitals provide the highest level of referral and also provide care for persons living in the urban area. The study site is one of these referral hospitals, providing both inpatient and outpatient care with a full complement of different specialty areas. There are approximately 700 inpatient beds, and 560 outpatients are seen daily in the clinics. Because this is a referral hospital the acuity level is high, especially for inpatients. The hospital has a newer building where most care units are located and an older facility about 5 kilometers away with prenatal, well woman, low-risk intrapartum, and postpartum care. A full-service HIV care facility is located next to the main hospital. In addition, the hospital inpatient and outpatient facilities serve many patients who are infected with HIV but have never been tested. The hospital has been part of a national infection control project and is viewed as a national model for infection control.

Because all hospital workers are regarded as sources of health information by their family and neighbors, the authors offered the intervention to all hospital workers, including both clinical and nonclinical staff. At the time the authors planned this project, they estimated the work force at approximately 800, based on personnel records, although records were not exact. Workers were divided into three groups according to occupation. A total of 38% of the participants were professionally and technically trained health workers including doctors, clinical officers, dentists, registered nurses, nurse-midwives, and x-ray, dental, and laboratory technicians. Most provided direct patient care and supervised clinical support workers. A total of 32% made up the second group of clinical support workers; these were paraprofessionals with training of 6 months or less. Most of them had direct patient contact, usually while providing physical care to hospitalized patients directed by the nurses and

other clinicians. A total of 30% were nonclinical workers, and these were all the workers whose jobs involved no patient treatment or care responsibilities. These included administrators, clerks, guards, maintenance personnel, laundry workers, and kitchen staff. An influx of workers, most of whom were clinical support staff, brought the total to over 850 by the end of the project.

Intervention

The *Mzake ndi Mzake* intervention for community members consisted of six sessions focused on the HIV epidemic and stigmatization; human sexuality and sexually transmitted infections; HIV prevention, AIDS, and testing; partner negotiation; condom use; and how to contribute to community HIV prevention. Based on the authors' formative evaluation of health workers (Talashek et al., 2007), four new sessions were added for health workers only on HIV issues they reported that they frequently encountered: a nontechnical overview of HIV treatment and symptom management, universal precautions, helping individuals and families address HIV prevention, and ethical issues for health workers related to HIV. Every session included guided discussions, role plays, return demonstrations with corrective feedback, and an assignment to practice a specific skill before the next session. Sessions lasted 90 to 120 minutes. Copies of the manual and data collection instruments are available from the corresponding author.

The sessions were implemented by two trained peer-group facilitators. Severe staff shortages at the urban hospital made it difficult to use the initial model of using two trained volunteer hospital workers as the facilitators. Therefore, most hospital worker peer groups were facilitated by one hospital worker and one member of the research team who was also a nurse. Training for both the workers and research team was accomplished by first having prospective facilitators go through the intervention as participants and then give return demonstrations with supportive corrective feedback from the trainers and their fellow volunteers. When they offered the sessions, the facilitators received ongoing support and guidance from the research team.

The peer-group intervention was made available for all interested workers. Nearly all of the hospital workers ($n = 855$) participated in all 10 sessions of the peer group. A total of 37% of the participants were clinicians/technicians, 39% were clinical support staff, and 24% were nonclinical staff.

Variables and Operational Measures

The data collection instrument was initially developed for the authors' Botswana studies (Norr et al., 2004) and revised for their Malawi primary school teachers' study (Norr et al., 2007) and the district health worker study described previously (Norr et al., 2006). The health worker variables presented here measure personal HIV prevention-related knowledge, attitudes, and HIV prevention behaviors. Table 1 shows the variables, operational measures, and reliability coefficients where appropriate.

Knowledge measures include a 6-item index of transmission knowledge that had acceptable reliability ($\alpha = .74$) and a single item on prevention of sexual transmission (the most

common mode of transmission in Malawi) taken from the Malawi Demographic and Health Survey (National Statistical Office, 2005) that has been widely used not only in Malawi but in many other African countries. The authors believed it was useful to retain this single-item measure to enhance the comparability of their report to other studies in Malawi and Africa.

Attitudes measured included hope about controlling the epidemic, two measures of stigma, favoring HIV testing, condom attitudes, and two measures of self-efficacy, one for personal safer sex behaviors and one for community prevention. The measures of condom attitudes and self-efficacy for personal sexual behaviors were both multi-item measures with acceptable reliability. Where the authors had two items measuring the same concept they created an index, because that index was a more stable measure than either single item. Hope, one stigma measure, favoring HIV testing, and self-efficacy for community prevention were all two-item indices. Despite measurement limitations inherent in a two-item index, these measures were retained because all of the attitudes were directly relevant for health workers in a country with a high HIV prevalence.

Stigma attitudes presented the authors with a measurement issue. They initially had six items about stigma, which they intended to use as a single attitude scale. However, psychometric analysis showed that the items were not a unidimensional construct. The two contact items were one factor, and the single item regarding blame was a unique dimension. Other items about HIV disclosure were not related to either contact or blame. The authors decided not to use them because respondents commented that they responded based on their beliefs about the societal stigma a person might be subjected to after disclosure rather than their personal attitudes.

The four behavior measures included discussion of safer sex with one's partner, a five-item index of sexual risk taking, whether the health worker had a recent HIV test, and a six-item index of reported community HIV prevention activities. Talk with partner was a two-item index that included talking about being faithful and/or about using condoms. Because these are the two primary possible means of HIV prevention with a partner, a two-item index seemed appropriate to measure this behavior.

Procedure

Ethical approvals were first obtained from the University of Illinois at Chicago institutional review board and the University of Malawi College of Medicine Research and Ethics Review Committee, and then the project was discussed with the hospital management team. The 10-session peer-group intervention was offered to all cadres of hospital workers. Health workers gave anonymous informed consent to participate (signed and documented by the researcher) to protect their identity regarding their work-related behaviors. Experienced research team members facilitated the first sets of peer groups for health workers, who had expressed interest in becoming peer-group facilitators. After training, these health workers cofacilitated all the other peer groups with an experienced project member.

An ongoing process evaluation monitored success and difficulty. Peer-group facilitators kept records of training sessions held, number and type of health workers trained in each session, and attendance. A structured observation of 110 sessions evaluated fidelity of the

intervention regarding both content and peer-group processes. These observations established that trained health worker volunteers paired with a project staff member were effective peer-group facilitators who delivered the intervention with fidelity to the conceptual model (McCreary et al., 2006).

Analysis

To evaluate the impact of the intervention, the authors examined the difference in proportions or means for each outcome variable between the baseline and final surveys. The authors also examined the regression coefficients (B), using ordinary least squares or logit regression models, for final-baseline differences in equations for each outcome variable controlling for the structural factors related to some of the outcome variables. These structural factors included job category, gender, age, food security, and education.

Results

The proportion of clinicians/technicians in the baseline sample was greater than the proportion in the hospital workforce because of oversampling of professional workers. The authors made a correction in the sampling for the postintervention survey. Thus the baseline and final health workers' survey samples differ significantly in job levels (Table 2). There was a higher proportion of clinicians/technicians (51% vs. 39%) and a smaller proportion of nonclinical support staff (12% vs. 22%) at the baseline than at the final survey. No other demographic factor differed significantly between the baseline and final evaluation samples. About 45% of both samples had completed secondary school, whereas one third had only primary school education. More than two fifths of the hospital workers said that their households had adequate food all the time. About 40% of the health workers were male, and nearly 60% of the sample were over age 35.

General HIV knowledge is important for health workers so that they know what behaviors will prevent the spread of HIV, both in their personal lives and in their work settings. The health workers had a fairly good knowledge of the general facts about HIV at baseline before the intervention began. On the 6-item HIV knowledge index, the health workers scored 81% correct at baseline (see Table 3). Their average knowledge increased significantly to 92% correct at the final evaluation. The authors asked health workers to name ways a person could keep from getting HIV and then counted how many named the three most widely recognized "ABC" strategies (i.e., abstinence, being faithful or reducing number of partners, and using condoms). The health workers were significantly more knowledgeable about HIV prevention strategies after the intervention. The impact of the intervention on both measures of knowledge remained significant when controlling for adequate food, age, gender, type of job, and education.

The authors examined several attitudes that have relevance for health workers as HIV prevention leaders: hope about the HIV epidemic in Malawi, degree of stigmatization of persons living with HIV, attitudes toward HIV testing and condoms, and self-efficacy for practicing safer sex and for community prevention. The hope index combined two items: hope that the HIV epidemic could be stopped and perceived likelihood that people could change sexual behaviors to prevent HIV. Health workers had a significant increase in their

sense of hope after the intervention. On a scale ranging from 1 to 4, with 4 being the most hopeful, the mean score increased from 2.3 to 2.8 (Table 3).

The authors examined two different aspects of HIV stigma: whether the health worker believed a person living with HIV should be blamed because of past behavior and whether contact with persons living with HIV should be permitted. Blaming people living with HIV declined significantly. However, acceptance of contact with persons living with HIV did not increase, mainly because the health workers were already at the top of the scale at baseline (2.97 on a scale where 3 = maximum acceptance of casual contact).

Attitudes favoring HIV testing increased significantly for all health workers. On a two-item index with a range of 0 to 2, the mean score was 1.7 at baseline, increasing to 1.9 after the workers received the intervention. Attitudes toward condoms have generally been very negative in Malawi. The authors assessed condom attitudes using a 10-item scale (scored as the percentage of items answered positively). The health workers had a mean score of 61% at baseline, which increased significantly to 80% after the intervention. The final set of attitudes measured relate to self-efficacy, or confidence in the ability to engage in HIV prevention activities. The health workers significantly increased their self-efficacy to talk with others about HIV prevention and to practice safer sex in their personal lives (see Table 3).

Controlling for individual health worker structural variables in regression equations did not reduce the strength of the intervention's effect on improving attitudes. Attitude about contact with persons living with HIV, the one attitude that was not significantly more positive in the postintervention survey, remained nonsignificant after controlling for structural factors.

The intervention was designed to affect health workers' personal HIV prevention behaviors as well as HIV prevention at the workplace. Personal behaviors examined were communication with partners about HIV prevention, sexual risk behaviors, being tested for HIV, and involvement in community HIV prevention activities (Table 4). Talking with one's partner is an important first step in evaluating current behavior and making changes needed to prevent HIV infection. The hospital workers were significantly more likely to report that they had discussed safer sex with their partners in the previous 2 months. Despite their increased self-efficacy for safer sex and increased discussions about safer sex with partners, the hospital workers showed no change in their reported risky sexual behaviors from baseline to the final evaluation. The proportion of hospital workers who reported that they had an HIV test in the previous 12 months increased significantly from 20.8% at baseline to 40.8% at the final evaluation. Health workers reported whether during the previous 2 months they had engaged in each of six HIV prevention activities in the community. The mean number of HIV prevention activities increased significantly from 3.98 to 4.92, an increase of nearly one more activity. In every case in which there was a statistically significant zero-order impact of the intervention on these behavior outcomes, that difference remained significant when controlling for job and other structural variables.

Discussion

After the intervention, the hospital workers had significantly higher knowledge about general HIV transmission and prevention issues and more positive attitudes, including more hope, less stigmatization of persons with HIV, more positive attitudes toward HIV testing and condom use, and higher self-efficacy to engage in safer sex and to discuss HIV prevention with others. The impact of the intervention on health workers' personal behaviors was mixed. Health workers were more likely to have had a recent HIV test, reported more discussion of safer sex and condoms with their sexual partners, and engaged in more community HIV prevention activities. However the peer-group intervention did not reduce health workers' risky sexual behaviors.

The lack of an intervention effect on personal sexual behaviors suggested that more work is needed to increase the effectiveness of the peer groups for this issue. The same peer-group intervention has been effective in reducing risky sexual behaviors for rural district health workers (Norr, Jere, Mbeba, Crittenden, & Kaponda, 2008). In the rural district project, the health workers had support from the research team over a much longer period, and some health workers were actively involved in offering peer groups to rural community members. These activities may have resulted in continuing reinforcement of the importance of personal safer sex behaviors for health workers. Also, urban hospital workers are less likely than rural workers to meet each other and reinforce HIV prevention messages because they live scattered throughout the city, whereas rural workers live close to each other and to the health facility. A recent infection prevention program in the urban hospital may also have influenced the hospital workers to focus more on occupation-related HIV prevention messages than personal HIV prevention messages. Possible strategies to enhance the impact of the intervention on sexual behaviors include more role plays with situations specific to the urban setting where the hospital workers reside, more emphasis on sexual behavior change from intervention leaders, postintervention supportive meetings to encourage continued commitment to personal HIV prevention, and community outreach programs that encourage hospital workers to be role models for HIV prevention.

This study had several limitations. There was no control group, and there were differences in the proportion of different types of workers in the baseline and postintervention health worker interviews. The authors statistically controlled for differences in types of workers and other structural factors, and the impact of the intervention remained significant for all outcomes that were statistically significant before adding controls. However, there was no way to fully control for the lack of a control group. Although the interval between the baseline and final evaluation was relatively brief, 12 months, a national effort to increase in the availability and promotion of HIV tests might have affected the results regarding testing, especially in urban areas where the central referral hospitals are located. There were also several attitudes measured with only two items, affecting reliability of those measures.

Implications

This study has shown that the *Mzake ndi Mzake* peer-group intervention is effective in improving hospital workers' HIV-related knowledge, attitudes, and some behaviors in their

personal lives and in the community. Helping hospital workers to reduce their personal risk of HIV infection can have important benefits for the health care workforce. Improving health workers' general knowledge of HIV and reducing their stigmatizing attitudes about persons living with HIV and condoms also may have positive effects on their interactions with clients and informal discussions with relatives and neighbors. Including lower-level workers in the intervention is important because they can provide more accurate information and appropriate referrals for care when they are asked questions by clients, relatives, and neighbors. The intervention had no effect on personal risky sexual behaviors, and the focus of the intervention on sexual behaviors must be strengthened. The authors recommend that the peer-group intervention be modified to incorporate more emphasis on personal sexual behaviors. The intervention then should be sustained at the hospital where it was introduced. All new workers should receive the intervention, and all workers should have regular opportunities for continuing HIV prevention discussion. The program should also be expanded to other hospital and clinic health workers throughout Malawi.

The possibility of engaging hospital workers in community outreach programs should also be explored as a way to both sustain health workers' enthusiasm for HIV prevention and as an important health promotion service to urban and peri-urban communities. The peer-group model may also be a more effective way than didactic instruction to introduce health workers to other innovations that require changes in attitudes and behavior as well as knowledge. This might include new programs related to HIV prevention and AIDS care as well as general health issues.

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Clinical Considerations

- Peer-group intervention on HIV prevention for urban hospital workers can result in higher levels of knowledge; more positive attitudes related to HIV prevention including more hope, less blaming of persons with HIV, and more positive attitudes about HIV testing and condoms; higher self-efficacy; and more reported talk about safer sex with partners, personal HIV tests, and community HIV prevention activities.
- A more effective intervention is needed to address personal risky behaviors of hospital workers and reduce their morbidity and mortality related to HIV.
- Improving hospital health workers' knowledge and attitudes related to HIV can enhance their capacity to be role models and HIV prevention leaders in health care facilities and in communities.
- Improving stigmatizing attitudes about HIV for hospital workers at all levels can reduce discrimination toward persons living with HIV and their families in health care facilities.
- Enhancing nonclinical and lower-level clinical hospital workers' knowledge and attitudes about HIV can increase their capacity to provide accurate HIV prevention information and appropriate health care referrals to clients who approach them in the clinical area and to their friends and neighbors in the community.

Table 1

Variables From Health Worker Interview

	Variable and Items	# of Items	Range	α^a
General knowledge	<i>HIV Knowledge Index</i> : % correct of 6 items (AIDS caused by virus/Menstruation washes away [false]/Cured by sex with virgin [false]/Not likely by: Giving blood/Mosquito bites/Using public toilet)	6	0-100%	.74
	<i>HIV ABCs Prevention Index</i> : # mentioned when asked how a person can prevent HIV (Abstain/Be faithful or reduce partners/Condoms)	1	0-3	–
Attitudes about HIV and AIDS	<i>Hope Index</i> : mean of 2 items: 4 (<i>very likely</i>) to 1 (<i>not likely</i>) (How likely: Stop HIV spread in Malawi/People will change sexual behavior)	2	1-4	–
	<i>Stigma Attitude–Blame</i> : A person living with HIV is to blame for being infected: 3 (<i>should be blamed</i>), 2 (<i>don't know</i>), 1 (<i>not to be blamed</i>)	1	1	–
	<i>Stigma Attitude–Contact Index</i> : mean of two items: 3 (<i>permitted</i>), 2 (<i>don't know</i>), 1 (<i>not permitted</i>) (Person living with HIV should be permitted: In public places/To cook a family meal)	2	1-3	.75
	<i>Favor HIV Test</i> : mean of two items: 2 (<i>agree</i>), 1 (<i>disagree or don't know</i>) (Afraid of positive results/No point in being tested because no cure [reversed])	2	1-2	–
	<i>Condom Attitudes Scale</i> : % positive of 10 items (sexual enjoyment for self and partner, three items; indicates promiscuity, five items; effective prevention, two items)	10	0-100%	.77
	<i>Self-Efficacy for Community Prevention</i> : mean of two 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 and relatives/own children)	2	1-3	–
	<i>Self-Efficacy for Safer Sex</i> : mean of six 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)	6	1-3	.80
Personal and community behaviors	<i>Partner Communication Index</i> : sum of two items: 1 (<i>yes</i>), 0 (<i>no</i>) (Talk with partner in last 2 months about safer sex/condoms)	2	0-2	–
	<i>Risky Sex Behaviors Index</i> : # of five risky sex behaviors in last 2 months (Unprotected Sex/Multiple Partners/Sex at bars/Sex for money/Sexually transmitted infection symptoms)	5	0-5	–
	<i>HIV Test in Last 12 Months</i> : 1(<i>yes</i>), 0 (<i>no</i>)	1	0-1	–
	<i>Community HIV Prevention Index</i> : # of six activities reported for last 2 months (Led discussion; Talked prevention/safer sex with: partner/other adults/own children/other young people; Contributed money or time)	6	0-6	–

^aInternal consistency coefficient, Cronbach's alpha (α).

Table 2

Demographic Characteristics of Interviewed Health Workers

	Baseline (<i>n</i> = 366)	Final (<i>n</i> = 561)
Job (%)		
Clinicians/technician	51	39 ^a
Clinical support staff	36	39
Nonclinical support staff	12	22
Educational level (%)		
Primary school or less	31.5	33.8
Some secondary school	21.6	21.8
MSCE or greater	46.8	44.4
Food security (%)		
Providing food is difficult	55.2	56.1
Adequate food always	44.8	43.9
Gender (% male)	37.2	41.9
Age (% over 35)	57.5	58.9
Marital status		
(% currently married)	75.4	71.7
% with a child under 18	77.5	77.5
Religious affiliation (%)		
Protestant	73.0	72.4
Catholic	22.0	23.2
Other/none	4.7	4.5

NOTE: MCSE = Malawi school certificate examination.

^a $p < .01$, chi-square.

Table 3

Health Workers' HIV Knowledge and Attitudes

		Comparison of Means or Percent				Multiple Regression Coefficient for Intervention-Control ^a	
		Base (n = 366)	Final (n = 561)	T	df	B	Std Error
<i>HIV Knowledge Index</i>	%	80.7	92.1	8.46 ^b	537	12.157 ^b	1.256
<i>HIV ABCs Prevention Index</i>	Mean (SD)	1.94 (.77)	2.06 (.73)	2.37 ^c	925	.149 ^c	.050
<i>Hope Index</i>	Mean (SD)	2.70 (.97)	2.23 (.92)	7.44 ^b	923	.445 ^b	.064
<i>Stigma Attitude–Blame</i>	Mean (SD)	1.46 (.84)	1.09 (.42)	−7.69 ^b	486	−.380 ^b	.043
<i>Stigma Attitude–Contact Index</i>	Mean (SD)	2.96 (.23)	2.97 (.18)	1.07	639	.014	.014
<i>Favor HIV Test</i>	Mean (SD)	1.65 (.40)	1.93 (.19)	12.54 ^b	473	.290 ^b	.020
<i>Condom Attitudes Scale</i>	%	60.6	80.0	11.98 ^b	676	20.569 ^b	1.571
<i>Self-Efficacy for Community Prevention</i>	Mean (SD)	2.78 (.41)	2.90 (.29)	4.83 ^b	599	.123 ^b	.024
<i>Self-Efficacy for Safer Sex</i>	Mean (SD)	2.42 (.60)	2.82 (.35)	11.42 ^b	518	.403 ^b	.032

^aControlling for age, gender, education, food security, and job category.

^b $p < .001$, t -test of significance, one-tailed.

^c $p < .01$, t -test of significance, one-tailed.

Table 4

Health Workers' Personal Behaviors

		<u>Comparison of Means or Percentages</u>				<u>Multiple Regression (OLS or logistic) Coefficient for Intervention-Control^a</u>	
		<u>Base</u>	<u>Final</u>				
		(<i>n</i> = 366)	(<i>n</i> = 561)	T	df	B	Std Error
<i>Partner Communication Index</i> (# discussed, range 0-2)	Mean (<i>SD</i>)	1.45 (.97)	1.95 (1.12)	4.73 ^b	841	.197 ^b	.051
<i>Risky Sex Behaviors Index</i> (sum of five items, range 0-5)	Mean (<i>SD</i>)	.79 (.64)	.78 (.57)	.40	919	-.030	.041
<i>Had an HIV Test in Last 12 Months</i> (%)	%	20.8	40.8	6.45 ^b	920	1.017 ^b	.163
<i>Community HIV Prevention Index</i> (sum of six items, range 0-6)	Mean (<i>SD</i>)	3.98 (1.80)	4.92 (1.60)	8.35 ^b	925	.812 ^b	.101 ^c

NOTE: OLS = ordinary least squares.

^aControlling for age, gender, education, food security, and job category.^b $p < .001$, *t*-test of significance, one-tailed.^c $p < .01$, *t*-test of significance, one-tailed.