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Impacts of a Peer Group Intervention on Occupation-Related Behaviors for Urban Hospital Workers in Malawi

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Abstract

Using a pre- and post-test design with no control group, we evaluated the impact of a peer group intervention on work-related knowledge and behavior for health workers at an urban hospital in Malawi. We surveyed unmatched random samples of health workers, observed workers on the job, and interviewed clients about hospital services at baseline and at 6 months after the intervention. Universal precautions (UP) knowledge, reported hand washing, and reported client teaching were significantly higher at the final evaluation. The outcome differences remained robust in multivariate analyses with controls for demographic factors of age, gender, education, food security, and job category. Observations found consistently greater use of UP, more respectful interactions, and more client teaching at final evaluation. Patient surveys reported more discussion with health workers about HIV at the final evaluation. Peer-group interventions can prepare health workers in Malawi for HIV prevention and offer a potential model for other African countries.

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Keywords

client teaching; health workers; HIV prevention; Malawi; peer group intervention; universal precautions behaviors; universal precautions knowledge

The HIV epidemic is a major public health challenge facing health care facilities and health workers, especially in Southern Africa where the epidemic is most severe (Joint United Nations Programme on HIV/AIDS [UNAIDS]). Health workers can play a key role in HIV prevention by practicing universal precautions (UP) to prevent the spread of HIV in health facilities and by teaching clients and their families about HIV prevention. As HIV testing and treatment rapidly expand in Africa, health workers are called upon to fill new roles (Merson, O'Malley, Serwadda & Apisuk, 2008), creating an urgent need to better prepare health workers to meet these challenges.

This is the second of two papers describing the impact of a peer group intervention for HIV prevention on urban hospital workers in Malawi. The first focused on health workers' personal HIV-related knowledge, attitudes, and behaviors (Kaponda et al., in press). In this paper we report the intervention's effects on work-related changes, specifically UP knowledge and practices, reported client teaching, and respectful interactions with clients and families. This study grew out of a larger project (Norr et al., 2006) to mobilize rural health workers as HIV prevention leaders for themselves and for rural communities because we recognized that urban hospital workers also needed the same HIV prevention training.

Background

There is a growing recognition that controlling the HIV epidemic requires strengthening health care systems and the capacities of individual health workers. Most African health care systems were already under-funded and understaffed before the epidemic. The HIV epidemic has greatly increased the number of patients needing repeated care, putting great pressure on health workers as they struggle to cope with this additional burden. In countries like Malawi where the epidemic is severe, people living with HIV (PLWH) and related co-infections, especially TB, now make up a sizeable proportion of the caseload (Garbus, 2003). The international outmigration of health workers, in part due to poor working conditions, makes the situation even more difficult (Aiken, Buchan, Sochalski, Nichols, & Powell, 2004). As the global effort to increase early testing and treatment accelerates, there is increased need for strong health systems with well-prepared health workers (Merson et al., 2008). The consistent use of UP and teaching patients and families about HIV in a respectful manner are two key areas where health workers can contribute to HIV prevention.

African Health Workers' Universal Precautions Needs

Health worker surveys and observations in Malawi and elsewhere in Africa document that health workers often fail to practice UP consistently and correctly (Garbus, 2003; Mbanya et al., 2001; Newsom & Kiwanuka, 2002; Nsubuga & Jaakkola, 2005; Orji, Fasubaa, Onwudiegwu, Dare, & Ogunniyi, 2002; Reis et al., 2005; Sadoh, Fawole, Sadoh, Oladimeji, & Sotiloye, 2006; Talashek et al., 2007; Walusimbi & Okonsky, 2004). Although there has been controversy about how much HIV transmission in Africa is due to unsafe health care practices (Gisselquist & Potterat, 2004; Schmid et al., 2004), eliminating all unsafe practices in health facilities should be an urgent priority for HIV prevention and for overall infection control. Incorrect practices include failure to wash hands and to use gloves, unsafe handling and disposal of sharps, and unsafe cleaning procedures. Both inadequate worker knowledge and health system problems, including periodic lack of essential supplies for prevention, staff shortages, and inadequate staff training and supervision, contribute to these unsafe practices

(Ansa, Udoma, Umoh, & Anah, 2002; Chelenyane & Endacott, 2006; Garbus, 2003; Hesse, Adu-Aryee, Entsua-Mensah, & Wu, 2006; Mbanya et al., 2001; Nsubuga & Jaakkola 2005; Reis et al., 2005; Sadoh et al., 2006; Smit, 2005; Walusimbi & Okonsky, 2004).

As a consequence of inconsistent use of UP, health workers put themselves and their clients at potential risk. In three African studies, health workers have reported unacceptably high rates of needle stick injuries, ranging from 37–57% of workers reporting at least one injury in the past year (Dieleman et al., 2007; Newsom & Kiwanuka, 2002; Nsubugu & Jaakkola, 2005). It is not surprising that African health workers fear occupational exposure, which further undermines their morale. Prophylactic treatment for occupational injury is relatively new in Africa, and some workers are unaware of the procedures to access prophylactic treatment (Dieleman et al., 2007). Many are unwilling to report injuries or be tested because of the stigma and discrimination that their fellow workers experienced when they were known to be infected with HIV (Dieleman et al., 2007; Kiragu et al., 2007; Tarwireyi & Majoko, 2003).

African Health Workers' Needs for Respectful Interactions and Teaching

Teaching clients and families about HIV and interacting with them respectfully is an important way for health workers to contribute to HIV prevention. However, health worker interactions with patients and teaching have been studied much less than UP. Several studies have found that African health workers were not always respectful, polite, or empathic with clients (Dieleman et al., 2007; Smit, 2005; Talashek et al., 2007). Moreover, health workers themselves noted that high patient loads, understaffing, fear about occupational exposure to HIV, and stressful working conditions had decreased their empathic interactions with clients (Dieleman et al., 2007; Raviola, Maachoki, Mwaikambo, & Good, 2002; Smit, 2005). These negative interaction patterns caused distress for all clients and families, undermined their trust, and often discouraged them from seeking needed care.

Health workers have also been shown to have many of the same stigmatizing attitudes toward HIV found in the general public (Adebajo, Bamgbala, & Oyediran, 2003; Atulomah & Oladepo, 2002; Mbanya et al., 2001; Ofili, Asuzu, & Okojie, 2003; Rahlenbeck, 2004; Reis et al., 2005). Stigmatizing attitudes further discourage respectful interactions with clients and their caregivers when the health worker knows or suspects that the client is living with HIV, and also make both health workers and clients reluctant to discuss HIV prevention. PLWH and their caregivers have reported feeling that health workers treat them with less respect and discriminate against them, which discourages them from seeking help from the health care system (Dlamini et al., 2007; Mwinituo & Mill, 2006). A study in Zimbabwe reported that health workers were reluctant to have an HIV test due to stigma and denial, and few had actually been tested, which inhibited their ability to be role models and to discuss HIV testing with clients (Tarwireyi & Majoko, 2003).

Client teaching can be integrated into most encounters, but doing so requires that health workers place a high value on client teaching, take the time to do so, feel comfortable about the health messages they are communicating, and establish sufficient rapport so that the client is engaged in learning from the health worker. The difficult working conditions health workers face, especially heavy patient loads and understaffing, discourage them from client teaching. The lack of respectful interactions discussed above also reduces health worker motivation to teach and the readiness of clients to ask questions and listen to advice. Additionally, there are several cultural barriers that make teaching about HIV prevention and care especially difficult for African health workers. In addition to the stigmatizing attitudes about HIV discussed above, the sensitivity surrounding discussion of sexual issues in most African cultures make both health workers and clients reluctant to discuss health promotion topics related to HIV and AIDS (Lugalla et al., 1999). Health workers have also stated that they are reluctant to talk with clients about HIV due to fears of incorrect knowledge (Adebajo et al., 2003; Atulomah & Oladepo,

2002; Mbanya et al., 2001; Ofili et al., 2003; Rahlenbeck, 2004; Reis et al., 2005; Uwakwe, 2000).

Previous Training for African Health Workers

African health care systems have generally provided at least some HIV prevention training for health workers, but inadequate training persists as a problem (Dieleman et al., 2007; Nsubuga & Jaakkola, 2005; Smit, 2005). Only about half of the workers in four Ugandan hospitals said they had been trained for all the HIV-related tasks they were expected to perform (Dieleman et al., 2007). These hospitals had informed staff of UP measures and made protective materials and HIV-related services such as testing and drug treatment available to staff, although they had not consistently communicated to staff about these services. They had not addressed stigma, voluntary counseling and testing for staff, supporting staff living with HIV, client teaching skills related to HIV prevention and care, or emotional support for staff.

Few health-worker-training programs have been systematically evaluated, but those that have been published have had favorable results. Two interventions in Nigeria significantly improved health workers' HIV-related knowledge, attitudes, and perceived counseling and treatment skills (Ezedinachi et al., 2002; Uwakwa, 2000). However, one of these studies did not address health system barriers, and the use of UP did not improve due to continued lack of supplies (Uwakwa, 2000). Another study found 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). Some African countries have successfully trained selected health workers in counseling and testing and/or home-based care (Ezedinachi et al., 2002; McCreary, Mkhonta, Popovich, Dresden, & Mndebele, 2004). As is true in many other African countries, lower-level health workers and non-clinical workers in health facilities in Malawi generally receive little or no HIV prevention training.

Reviews of HIV prevention interventions have consistently identified greater impacts on behavior change when interventions are theoretically based and build skills as well as knowledge (Ezedinachi et al., 2002; Kebaatswe & Norr, 2002; Mahajan, Colvin, Rudatsikira, & Ettl, 2007; Merson, Dayton, & O'Reilly, 2000). However, few descriptions of theoretically based HIV prevention interventions for health workers have been published.

To partially address this gap, our research team has developed and tested a peer group intervention for health workers based on an innovative conceptual framework that integrates social-cognitive learning theory, contextual tailoring, and the World Health Organization's primary health care model of health worker-community collaboration (Norr et al., 2006). However, we realized that urban hospitals also needed HIV prevention. To meet this need, we obtained supplemental funding and implemented this peer group intervention for HIV prevention with urban hospital workers in a large hospital in the Central region of Malawi.

Methods

Study Design

We used a pre-/post-test design with no control group to evaluate the impacts of the intervention on urban hospital workers, with unmatched samples at each time period. There are only four referral hospitals in Malawi, located in different geographic areas to provide nationwide coverage. It was not feasible within our budgetary constraints to use another referral hospital as a control group. At the referral hospital, all staff intermingle and discuss events at the workplace on a daily basis. We anticipated that workers who participated in the intervention would talk with others who did not and thus spread the effect of the intervention. Therefore, we did not use a control group because of the threat of contamination.

We assessed health workers' UP knowledge and practices and their respectful interactions and client teaching using three data collection methods: surveys, observations of health workers, and a client satisfaction survey. We used unmatched samples to evaluate the intervention for two reasons. We wanted to observe the impacts of the intervention for the hospital as a whole, not just for individuals or designated units. A "snapshot" of all workers before and after the intervention, including those who participated and those who did not, permitted us to estimate the overall change in the workforce as a whole. In fact, virtually all the workers did participate, so it would not have made much difference whether we included only participants or all workers. However, we did not expect that the program would be so popular when we were designing the study. Also, matching was not possible for the observations or client surveys because these were conducted anonymously. Matching would have been difficult for the health worker survey because of the lack of computerized, accurate, and up-to-date records, combined with the complex scheduling process for workers rotating across three shifts and taking periodic leave.

Site and Sample

Site—Malawi has a national primary health care system with a network of community, district, and regional facilities. The study site was in one of four regional referral hospitals with a full complement of different specialty areas and approximately 700 inpatient beds. About 560 outpatients were seen daily in various clinics. The acuity level was high, especially for inpatients. Although the availability and acceptability of HIV testing is increasing rapidly, the majority of PLWH (even in urban areas of Malawi) had never been tested. Consequently, many patients who were infected with HIV had not been tested and may not have had any symptoms to raise concerns about HIV. In addition, many patients had TB and other HIV-related co-infections such as meningitis.

Sampling procedures—Purposive, unlinked samples were selected for health worker interviews, observations, and client satisfaction surveys at baseline and final evaluation. The hospital had a total work force of more than 850, and all workers were eligible to participate. There were more than 25 different job titles for hospital workers. In order to compare different types of workers, we needed to develop broad job categories. Based on their many years of clinical experience, the Malawi co-investigators divided the workers into three categories according to job activities and educational qualifications. The highest level, *clinical and technical workers*, included physicians, clinical officers, RNs, enrolled nurses, and technicians in laboratory, radiology, pharmacy, dentistry, and other specialties. All had had 2 or more years of professional training. Because highly trained health workers were in short supply in Malawi, over half of the workers were enrolled nurses, a level equivalent to the practical nurse in the United States. *Clinical support workers* provided extensive direct care to patients but were not responsible for clinical diagnosis or treatment. This category included mainly ward attendants, who had little training, most of which occurred on the job. *Non-clinical support staff* had no direct patient contact and included administrators, office and ward clerks, guards, maintenance personnel, laundry workers, and kitchen staff. The education level of this category varied considerably, but the majority of non-clinical workers had low status jobs with little formal education. At baseline, the hospital roster included 38% clinical and technical workers, 32% clinical support staff, and 30% non-clinical workers.

We were not able to randomly select health workers for the health worker survey interviews because the hospital employee roster was not sufficiently accurate due to high turnover and non-computerized personnel records. Therefore, we used the roster to identify all of the hospital's in-patient, outpatient, and service units. We then purposefully sampled staff from each selected unit to obtain a diverse and reasonably representative sample of health workers. We went to selected units and interviewed workers present at the time. The hospital inpatient

units had two shifts, and we interviewed both day and evening shifts. At baseline, we interviewed 360 health workers, 51% of whom were clinical and technical workers, 38% clinical support workers, and 12% non-clinical workers. Because we had under-sampled non-clinical workers at baseline, we added non-clinical units to the sample and interviewed a total of 561 hospital workers at the final evaluation. The final sample was more representative of the hospital workforce, including approximately 39% clinical and technical workers, 39% clinical support workers, and 22% non-clinical workers.

For health worker observations, we wanted to observe health care workers engaged in an activity with clients and/or requiring use of UP. The unit of analysis for our observations was the procedure or situation being observed, not the health worker. To obtain a diverse sample of situations, we went to the same inpatient and outpatient units identified for the health worker survey, as well as support services such as laundry where the use of UP was relevant. We went on different days of the week and different times of day, including evening hours for the in-patient units. We observed 316 activities at baseline and 308 at the final evaluation.

We used the same units, days, and times for client satisfaction surveys. We invited all clients who were present at those times to participate, excluding those who appeared acutely ill, in pain, or otherwise not appropriate to disturb. In the case of children younger than 15 we asked the accompanying parent or guardian to respond to the survey. We conducted brief oral surveys with 310 clients at baseline and 678 at the final observation. There were more client surveys at the final evaluation because some areas had many clients at the final observation, and each interviewer had been instructed to invite all the clients present in the designated unit to participate in the survey. Interviewers conducted oral surveys because of the low literacy levels of many clients.

Demographic characteristics of health workers—The health worker surveys included questions about demographics. Participants were about 60% female and relatively well educated compared to all Malawian adults (45% fully completed secondary school or more with only one third reporting a primary education level or less) at both baseline and final evaluation (See Table 1). About three fifths were over the age of 35. As noted above, the baseline sample had significantly more clinical and technical workers and fewer non-clinical workers than the final evaluation. No other demographic characteristics were significantly different between the baseline and final health worker surveys.

The Intervention

The *Mzake ndi Mzake* (Friend to Friend in Chichewa) peer group intervention consisted of 10 sessions, 6 about HIV prevention for the general public and 4 focused on health worker issues, including a non-technical overview of HIV treatment and symptoms management, UP, ethical issues for HIV, and teaching individuals and families. Guided discussions, role-plays, return demonstrations with corrective feedback, and assignments to practice specific skills prior to the next session were integral components of each session. Each session lasted 90–120 minutes. In contrast to most health worker training programs, the emphasis was on learning key skills, such as washing hands correctly, discussing the importance of wearing gloves with a coworker, or beginning a conversation about condoms with a client.

Trained members of the target group facilitated most of the peer group interventions. Because of persistent staff shortages and the high patient acuity level at the referral hospital, it was difficult to release two health workers simultaneously to co-facilitate 10 sessions. Therefore, we modified the peer group facilitation plan, and a team of one trained volunteer hospital worker and an experienced research nurse facilitated most peer groups for the urban hospital workers. Selected sessions were observed using a theoretically based structured observation

guide (McCreary et al., 2006), which documented fidelity to the intervention as offered by these co-facilitators.

Procedure

Before initiating the research, we obtained ethical review and approval from the University of Illinois at Chicago Institutional Review Board and the University of Malawi's College of Medicine Review Board. The Chief Medical Officer and Chief Nursing Officer helped develop the implementation plan, were very supportive of the project, and agreed that the research staff should work directly with the Hospital's newly formed AIDS Coordinating Committee to minimize disruptions to health care services while conducting the study.

After obtaining consent, we conducted baseline health worker interviews, observations, and client surveys as described above. Before each observation, verbal informed consent of both health workers and clients were obtained. All observations and interviews were anonymous to protect the workers' and clients' identities. The data collection team was trained in interviewing and observation using the instruments and extensive mock-interviews with corrective feedback. Observers were trained to achieve an inter-observer reliability coefficient of >.85 to assure reliability prior to data collection.

The *Mzake ndi Mzake* peer group intervention was then provided to all interested workers. Nearly the entire hospital staff participated (855 workers). Of the health workers who were trained, 37% were clinicians/technicians, 38% were clinical support staff, and 24% were non-clinical support staff.

The final evaluation was conducted an average of 6.5 months after the peer group interventions were completed. For different units, the time to evaluation after completion of the intervention ranged from 2–10 months. We used the same procedures at baseline and final evaluation.

Measures

Each of these instruments had been used in an earlier rural study (Norr et al., 2006). Both the health worker interview and the client survey were conducted in Chichewa. Experienced researchers fluent in English used the observation form. The variables related to UP and client teaching from each of these three sources are listed in Table 2.

Health care worker survey—The specific survey items reported in this paper were developed for this study based on our qualitative formative evaluation (Talashek et al., 2007). Content validity for these measures was established using a panel of Malawian clinical experts not directly involved in our research at Kamuzu College of Nursing. A small pilot test established feasibility and comprehensibility for Malawian health workers. The UP knowledge indices were designed to tap different domains of knowledge and were scored as percent correct. They were not anticipated to be uni-dimensional scales. Behaviors reported on the survey were also composite indices and not scales. Variables from the survey reported here included knowledge about UP, reported use of hand washing and glove wearing precautions in the previous month, and reported teaching or counseling of clients about issues related to HIV in the previous month.

Health worker observations—An observation checklist, developed for our larger study involving rural health workers (Norr et al., 2006), was also used in this research. Content was based on formative evaluation of health workers (Talashek et al., 2007) and content validity was further strengthened by consultation regarding appropriateness of items with the Malawian clinical experts who had evaluated the survey. Repeated pilot observations refined items until they were easy to rate and inter-rater reliability (coefficient of agreement >.85) was established

during observer training. Observers were experienced nursing faculty who were not directly involved in the project but who had many years of clinical practice and clinical teaching experience. Observers judged whether the activity being observed required the use of specific UP procedures and, if so, whether the health worker took appropriate precautions. The two UP variables we examined here were whether hands were washed and whether gloves were worn. If the behavior was not required, the variable was coded as missing and dropped from analysis. We also observed correct cleaning procedures and correct handling and disposal of sharps, but these did not occur frequently enough to be compared.

The observers judged whether there was an opportunity to teach either a client or a family member, and if so, whether the health worker did any teaching related to the encounter. We began with the assumption that nearly all clinical encounters should involve teaching. If no client was present or a client was heavily sedated, in pain, or distressed, the situation was judged as not an opportunity to teach and dropped from analysis. This variable was scored as *yes* if teaching occurred and *no* if it did not.

If a client was present, we also rated the health worker's interactions with the client for 11 aspects of interaction, such as a polite greeting and explanation of the problem or procedure, which we viewed as indicators of the degree of respect shown to the client. If not applicable, that item was dropped from analysis. For example, if no family member was present the item, *includes family members appropriately*, was coded as *not applicable* and the case was excluded in the analysis of that variable. Respectful interactions were scored as the percent of applicable aspects of interaction that were respectful.

Client satisfaction—As part of a survey of inpatient and outpatient client satisfaction with overall care provided at the hospital, we asked whether any health worker had talked with them about at least one of three HIV-related topics during a clinic visit or hospital stay (scored as 1 if at least one topic was discussed). The client satisfaction survey was an adaptation of a client satisfaction survey used in the United States for prenatal clinic visits (Handler, Rosenberg, Raube, & Kelley, 1998). Again, we consulted with Malawian clinical experts to determine appropriateness of the items for health workers in Malawi.

Analysis

We first compared baseline and final evaluation on outcome variables for differences in percents and means using t-tests of independent samples. For data from the health worker interviews, we also used multiple regression (ordinary least squares or logistic) analyses to examine intervention effects with controls for demographic factors: age (if under 30, if 50 or older, with 30–49 used as the reference category), gender (if male), education (if secondary school graduate or more and if primary school only, with some secondary school as the index category), food security (if adequate food all the time), and job category (if professional or technical and if non-clinical, with clinical support as the index category).

Results

Knowledge and Reported Behaviors

Health workers' initial knowledge of UP was high; the average correct score (the mean over the 4 areas of glove wearing, hand washing, sharps, and cleaning knowledge) was 77% at baseline (see Table 3). There was a small, but statistically significant, increase to 79% for Total UP Knowledge after the intervention. Knowledge was highest for glove wearing and hand washing - > 80% correct - and lowest for correct sharps knowledge, just over 60%. After the intervention, knowledge improved most in the area of cleaning.

Self-report of appropriate glove wearing and hand washing was very high at baseline, averaging at least 4.5 on a 5-point scale where 5 indicated *always* and 1 was *seldom or never*. There was virtually no change in reported glove wearing (4.87 vs. 4.88), but a small, statistically significant increase in hand washing was reported after the intervention. Health workers reported how many of five HIV-related teaching and counseling activities they had done in the previous month. Topics discussed with clients increased substantially from baseline to final evaluation.

When we controlled for demographic factors (age, gender, education, food security, and job category), intervention effects were stronger. The post-intervention vs. baseline multiple regression coefficients (B) in all of the equations for the knowledge measures and for the self-reports of hand washing and teaching were all more than twice their standard errors and the t-tests were statistically significant. Self-reported glove wearing was the only variable for which multivariate analyses found no significant differences for the intervention.

Preparation and daily experiences with patients differed considerably by job, and the controls for job category showed a consistent effect, so we examined UP knowledge, self-reported use of UP, and self-reported teaching separately by job (see Table 4). Of the three groups, clinical and technical health workers had the highest knowledge scores and reported teaching at baseline. After the intervention, clinical and technical workers had significantly higher knowledge scores and reported hand washing and teaching. The clinical support workers had increases in knowledge about some aspects of UP, and they had significantly higher self-reported glove wearing, hand washing, and client teaching after the intervention. The non-clinical workers had significantly higher overall knowledge of UP and reported HIV teaching at final evaluation. Thus, all three occupational groups benefited from the intervention.

Observed Behaviors

Observations of health workers' on-the-job activities found consistently greater use of UP and more respectful interactions and teaching with clients at final evaluation (see Table 5). At baseline, health workers were observed to wear gloves when needed only 79% of the time, which increased to 85% during the final observations. The proportion washing their hands in appropriate situations was also much higher at final observation, increasing from 64.5% of the time to 83% of the time at the post-intervention observation.

A large increase in teaching was also observed. The proportion of health workers who used an opportunity to teach increased significantly from under half of the occasions at the baseline to 69% of the occasions at final observation. The proportion of interactions with clients that were judged to be respectful also increased significantly from baseline to the final evaluation.

We then examined differences in observed behaviors for clinical and technical workers compared to clinical support workers. There were too few observations on non-clinical support workers to examine separately. Because we observed situations with potential risk of contamination and/or opportunities for client teaching, the observed health workers were mainly clinical and technical workers, with about 25% clinical support workers and a few non-clinical support workers. The baseline and final observations did not differ in the type of worker observed.

As would be expected given their higher level of training, at baseline clinical and technical health workers demonstrated greater use of UP, more client teaching and more respectful interactions with clients than clinical support workers. Clinical and technical workers wore gloves slightly less often than clinical support workers. However, at baseline we observed that many workers wore gloves inappropriately (e.g., wearing one pair of gloves until they were visibly soiled or torn, even when caring for multiple clients). Failure to change gloves was not

observed as often at the final evaluation. At final evaluation after the intervention, glove wearing was significantly higher for clinical and technical workers, but hand washing increased only slightly and was not significantly higher than at baseline. Use of opportunities to teach was substantially higher at final observation, increasing from 53% to 71% of these occasions, and respectful interactions also increased significantly.

Clinical support workers had no change in glove wearing practices. However, hand washing was observed significantly more often at final observation than at baseline (40% at baseline and 90% at final observation). Clinical support workers, because of the nature of their work, were observed for only a small number of occasions where they were interacting with clients and even fewer occasions where the observer judged that it would be appropriate to teach. The proportion of clinical workers who were observed teaching clients or families was significantly higher at the final observation (15% at baseline and 50% at the final). The proportion of interactions with clients judged to be respectful also increased significantly, from 35% at baseline to 74% at final observation. However, for both of these variables, the small number of observations means that these results may not represent a stable difference.

Client Reports of Health Worker Teaching

Our third source of data on intervention effect came from the client survey. While we could not expect patients to reliably report on health workers' UP behaviors, we did ask about discussions related to HIV that had occurred. At the baseline survey, 28% of the 310 clients surveyed said that a health worker had talked with them about some aspect of HIV infection. At the final survey, 37% of the 683 clients surveyed reported that a health worker had talked with them about HIV. This difference between baseline and final evaluations was significant ($p < .01$, $t = 2.937$, $df = 639$).

Discussion

This study showed that a multi-session peer group intervention could be successfully provided for all workers in a large and complex hospital and that the intervention improved hospital workers' knowledge about and practice of UP, client teaching, and respectful interactions with clients. A previous publication also documented that health workers had higher general HIV knowledge, more positive attitudes, and increased HIV testing and community involvement in HIV prevention after this same intervention; they did not, however, report fewer risky sexual behaviors (Kaponda et al., in press). Results also documented that workers at all levels benefited from the intervention. Improving work-related performance for clinical support staff is especially important in Malawi and other African countries. Because of the shortage of trained professions, clinical support workers perform many tasks that would be left to professionals in other health systems.

While there were some implementation challenges related to understaffing, high staff turnover, and multiple shifts, hospital workers were willing to volunteer as peer group facilitators and nearly the entire work force participated in the intervention. This high participation indicated that hospital workers at all levels had a high commitment to preparing themselves for HIV prevention, and, with training and mutual support, could change their behaviors.

At the start of the project, health workers in this hospital had similar barriers to those described for health workers in other African countries, including shortages of supplies, understaffing, inadequate knowledge or training, fear of occupational transmission, and low morale (Ansa et al., 2002; Chelenyane & Endacott, 2006; Dieleman et al., 2007; Garbus, 2003; Hesse et al., 2006; Mbanya et al., 2001; Raviola et al., 2002; Reis et al., 2005; Sadoh et al., 2006; Walusimbi & Okonsky, 2004). Previous interventions for health workers have also resulted in improved knowledge and attitudes, but in Nigeria, only the intervention that also addressed health system

barriers improved UP practices (Ezedinachi et al., 2002; Uwakwa, 2000). Our study found improved use of UP and client teaching without any increased system resources. It is possible that the involvement of hospital management and workers in the implementation of the project had an indirect impact on other system barriers. Thus, our intervention has potential usefulness for health workers throughout Africa faced with similar challenges.

The use of multiple data sources to evaluate the impact of the intervention on health worker job-related HIV prevention was a strength of our study. For the most part, the health worker interviews, observations, and client satisfaction interviews all showed the same results. For example, the health worker interview found increased knowledge of hand washing and reported hand washing, and the observations also found increased hand washing. Increased client teaching about HIV was identified in all three data sources.

Limitations

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 post-intervention health worker interviews. We controlled for differences in types of workers statistically, and most of the intervention impact occurred across all three occupational groups. Another limitation was the potential for bias related to social desirability. Most research participants want to give a socially correct response or to model correct behaviors. In this case, there was a possibility that after the intervention health workers were more aware of the "correct" response on the questionnaire or the "correct" behaviors to be observed. It has generally been noted by participant-observers that after a relatively short time persons being observed revert to their pre-observation behaviors (Bernard, 1999). For our observations, we generally remained in a unit long enough for the health workers to become accustomed to our presence and forget that we were observing. Using outside observers who were not members of the intervention team helped reduce observer bias and may have reduced workers' perceived pressure to perform and fear of being evaluated. However, these threats to valid observation cannot be entirely eliminated.

Implications

Strengthening the health care system through better HIV prevention preparation for health workers is increasingly recognized as a key component in overall HIV prevention. Reducing unsafe practices controls the potential spread of HIV and many other infections, while increasing empathetic teaching about HIV contributes to national HIV prevention efforts. This study has shown that a peer group intervention such as *Mzake ndi Mzake* can be effective in improving hospital workers' UP knowledge and behaviors, increase respectful interactions, and support HIV-prevention teaching with clients. This intervention should be made available for health workers in Malawi, and may also provide a model for preparing health workers in HIV prevention throughout the African countries.

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Table 1

Demographic Characteristics

Interviewed Health Workers	**Baseline (*n* = 366)**	**Final (*n* = 561)**
Job (%)		
Clinicians/Technicians	51.4	38.6**
Clinical Support Staff	36.3	39.4
Non-clinical Support Staff	12.3	21.9
Gender (% Male)	37.2	41.9
Age Mean Years (*SD*)	38.1 (8.98)	38.3 (9.49)
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 (%)		
Struggles to provide	23.6	24.3
Enough, little left over	31.6	31.8
Adequate all the time	44.8	43.9
Observed Health Workers	Baseline (*n* = 315)	Final (*n* = 319)
Job (%)		
Clinicians/Technicians	70.2	69.0
Clinical Support Staff	26.3	25.1
Non-clinical Support Staff	3.5	6.0

** *p* <.01, Chi square

MSCE = Secondary school completion (certified by examination)

Table 2

Variables and Operational Measures

	Variable and Items	# of Items	Range
A. From Health Worker Interview:			
Universal Precautions Knowledge	*Total UP Knowledge*: Average % on 4 Indexes -Gloves, Hand Washing, Sharps, Cleaning	22	0–100%
	Glove Wearing Knowledge: % correct of 15 items (blood, body fluids, IV, garbage, death, bed, giving medication, cleaning floor/equipment, giving/preparing food, feeding, lifting, torn gloves, after each patient)	15	0–100%
	Hand Washing Knowledge: % correct of 3 items (before client, touched blood, after contaminated equipment or surfaces)	3	0–100%
	Sharps Knowledge: % correct of 2 items (needle re-cap & sharps disposal)	2	0–100%
	Cleaning Knowledge: % correct of 2 items (when to clean exam tables & what cleans contaminated surfaces)	2	0–100%
Universal Precautions & Teaching Behaviors Self-Reports	*Glove Wearing Behavior*: Mean of 4 items (5 *Always* - 1 *Seldom/Never*: blood & bodily fluids, garbage, start IV, contaminated equipment)	4	1–5
	Hand Washing Behavior: Mean of 7 items (5 *Always* -1 *Seldom/Never*: between patients, blood contact, before/after start IV, before/after injections, contaminated equipment/ garbage)	7	1–5
	Teaching & Counseling Patients & Families: % of 5 actions (talk to patients about HIV status, safer sex/condoms; talk to families about stigma & protection in care of PLWA; encourage HIV test)	5	0–100%
B. From Health Worker Observation:			
Universal Precautions Behaviors	*Gloves Worn*: Whether gloves were worn if appropriate in the observed situations (1 = *Yes*/0 = *No*; e.g., examining a sore, starting an IV, working with contaminated linens)	1	0–1
	Washed Hands: Whether hands were washed if appropriate in the observed situation (1 = *Yes*/0 = *No*; e.g., before examining a patient, after removing gloves, after disposing of trash)	1	0–1
Teaching	*Used Opportunity to Teach* if appropriate in interaction (1 = *Yes*/0 = *No*)	1	0–1
Interaction	*Respectful Interaction:* % of 11 appropriate interactions: polite greeting, includes family, respects modesty, privacy, discusses health problem, explains procedure, sensitively asks, elicits feelings, responds to emotions, body language, eye contact	11	0–100%
C. Client Satisfaction Survey:			
Teaching	*Talk HIV/AIDS*: Single items (1 = *Yes*, at least one topic/0 = *No: Did anyone talk to you about: HIV or AIDS; condoms or other ways of preventing HIV; getting an HIV test?*)	1	0–1

UP = Universal Precautions

Table 3

Urban Health Workers Reported Universal Precautions and HIV Client Teaching

	Comparison of Means or Percents					Multiple Regression (OLS) Coefficient for Post-Intervention vs. Baseline[a]	
		Baseline (*n* = 366)	Post-Intervention (*n* = 561)	*t*	*df*	B	Std. Error
Universal Precautions Knowledge							
Total UP Knowledge	%					4.26***	.95
Glove Wearing Knowledge	%	81.28	82.43	1.00	906	2.71*	1.20
Hand Washing Knowledge	%	88.95	91.01	1.53	917	3.06*	1.34
Sharps Knowledge	%	62.53	62.23	−.15	921	.10**	.03
Cleaning Knowledge	%	77.60	81.19	1.80*	740	5.96***	1.91
Universal Precautions & Teaching Behavior Self-Reports							
Glove Wearing Behavior	Mean (s.d.)	4.87 (.37)	4.88 (.46)	.57	832	.02	.03
Hand Washing Behavior	Mean (s.d.)	4.47 (.72)	4.63 (.66)	3.28***	840	.13**	.05
Teaching & Counseling Patients & Families	%	52.47	68.28	7.29***	888	16.02***	2.16

[a] Controlling for age, gender, education, food security, and job category UP = Universal Precautions

* $p < .05$, t-test of significance, 1-tailed

** $p < .01$, t-test of significance, 1-tailed

*** $p < .001$, t-test of significance, 1-tailed

Table 4

Urban Health Workers Reported Universal Precautions and Client Teaching by Job Category

		Comparison of Means or Percents			
Job Category -Knowledge & Behavior		**Baseline**	**Final**	***t***	***df***
Clinical & Technical Health Workers		(*n* = 217)	(*n* = 188)		
Universal Precautions Knowledge					
Total UP Knowledge	%	83.40	89.49	5.62***	403
Glove Wearing Knowledge	%	82.74	88.50	3.91***	397
Hand Washing Knowledge	%	88.52	96.45	5.16***	337
Sharps Knowledge	%	75.00	84.95	3.98***	389
Cleaning Knowledge	%	87.50	88.02	.23	403
Universal Precautions & Teaching Behaviors Self-Reports					
Glove Wearing Behavior	Mean (*SD*)	4.86 (.37)	4.88 (.40)	.36	395
Hand Washing Behavior	Mean (*SD*)	4.26 (.75)	4.47 (.66)	2.87**	398
Teaching & Counseling	%	58.67	71.66	4.14***	400
Clinical Support Health Workers		(*n* = 221)	(*n* = 133)		
Universal Precautions Knowledge					
Total UP Knowledge	%	75.20	76.90	1.22	352
Glove Wearing Knowledge	%	78.89	82.66	2.18*	348
Hand Washing Knowledge	%	89.65	91.55	.99	351
Sharps Knowledge	%	56.87	52.49	−1.71	350
Cleaning Knowledge	%	75.94	81.00	1.65*	352
Universal Precautions & Teaching Behaviors Self-Reports					
Glove Wearing Behavior	Mean (*SD*)	4.87 (.36)	4.95 (.23)	2.33*	202
Hand Washing Behavior	Mean (*SD*)	4.68 (.60)	4.81 (.50)	2.15*	237
Teaching & Counseling	%	46.95	66.73	5.82***	247
Non-clinical Support Health Workers		(*n* = 123)	(*n* = 45)		
Universal Precautions Knowledge					
Total UP Knowledge	%	59.04	65.32	1.67*	166
Glove Wearing Knowledge	%	82.38	71.44	−3.47	156
Hand Washing Knowledge	%	88.64	80.49	−2.12	152
Sharps Knowledge	%	26.14	39.84	2.72**	69
Cleaning Knowledge	%	41.11	69.51	4.59**	166
Universal Precautions & Teaching Behaviors Self-Reports					
Glove Wearing Behavior	Mean (*SD*)	4.88 (.42)	4.66 (.95)	−1.52	85
Hand Washing Behavior	Mean (*SD*)	4.83 (.56)	4.56 (.95)	−1.86	95
Teaching & Counseling	%	42.89	64.42	3.66***	149

* *p* <.05, t-test of significance, 1-tailed

** *p* <.01, t-test of significance, 1-tailed

*** *p* <.001, t-test of significance, 1-tailed

Table 5

Observations of Urban Health Workers' Universal Precautions Behavior and Teaching

	Comparison of Percents			
	Baseline % (*n*)	**Final % (*n*)**	***t***	***df***
All Health Workers				
Gloves Worn	79.09 (263)	85.35 (198)	5.07***	559
Hands Washed	64.53 (296)	82.64 (288)	1.76*	449
Used Opportunity to Teach	49.74 (191)	68.89 (135)	3.55***	301
Respectful Interaction	66.82 (251)	80.14 (253)	5.82***	433
Clinical & Technical Health Workers				
Gloves Worn	77.49 (191)	86.09 (151)	2.08*	339
Hands Washed	74.29 (210)	79.80 (203)	1.33	410
Used Opportunity to Teach	53.49 (172)	70.73 (123)	3.07**	276
Respectful Interaction	71.55 (217)	81.39 (209)	4.34***	383
Clinical Support Health Workers				
Gloves Worn	83.58 (67)	82.05 (39)	−.201	104
Hands Washed	40.00 (80)	90.54 (74)	7.79***	131
Used Opportunity to Teach	15.79 (19)	50.00 (10)	1.82*	14
Respectful Interaction	34.75 (32)	74.09 (41)	5.98***	71

* $p < .05$, t-test of significance, 1-tailed

** $p < .01$, t-test of significance, 1-tailed

*** $p < .001$, t-test of significance, 1-tailed