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HIV Knowledge Improvement among Nurses in India Using a Train-the-Trainer Program

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Abstract

Nurses play a major role in the health care delivery system; therefore education of nurses is critical to successful prevention programs for persons with HIV. Little is known about nurses' knowledge of HIV in India. The purpose of this study was to determine the effects of a nurse-led train-the-trainer HIV education program on improving the HIV knowledge of nurses. A group of senior nurses ($N = 10$), were responsible for training a cohort of 10 nurses each, totaling 100 nurses. The 2-day training program included HIV epidemiology, and etiology, infection control, psychosocial support, counseling, modes of transmission, natural history of the disease, symptoms of early and late disease, diagnostic testing, and legal and ethical issues. Pre-and post-test scores were calculated using a self-administered structured questionnaire that measured HIV-related knowledge in terms of cognitive and transmission knowledge. Paired t-tests indicated that both measures of HIV knowledge improved significantly from pre-test to post-test.

Keywords

HIV knowledge; India; nurses

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It is now estimated that India has approximately 2.5 million persons infected with HIV (Joint United National Programme on HIV/AIDS [UNAIDS], 2007). While this new estimate of HIV prevalence is lower than previously reported, in a country already burdened by *mycobacterium tuberculosis* (TB) and a health system that has been unable to respond with consistency to serious health problems, the impact of an HIV epidemic renders the prospect of catastrophic health implications a reality. HIV treatment and care is expanding rapidly, and health care provider education and training is one of many factors critical to the rapid increase in high-quality care. Even so, few areas have a comprehensive training plan, including a clear assessment of ongoing training needs, or adequate funds budgeted for training (McCarthy, O'Brien, & Rodriguez, 2006).

Intensive interactive HIV professional training workshops can increase knowledge, attitudes, and willingness of health care professionals to provide care to persons infected with HIV. Nurses, in particular, can make a critical difference by providing quality physical care and emotional support for persons living with HIV (PLWH) as well as for their families. Yet, little information is available about the knowledge of HIV held by nurses and, subsequently, how this may influence their nursing care of PLWH.

Current Status of HIV Knowledge among Health Care Professionals

The HIV epidemic challenges nurses to become key players in the prevention and management of HIV, to increase their knowledge about this devastating illness, and to provide effective HIV prevention and care to their patients (Williams et al., 2006). However, in a recent Indian study conducted to assess the knowledge, attitude, and practice of universal health precautions in a sample of 203 health care professionals from Pune, India, findings revealed 85% of nurses did not apply the universal safety protocol, 13.5% of the physicians were not aware that HIV was transmitted by blood, and 30% of consultants chose to avoid contact with HIV-infected patients altogether (Menon & Bharucha, 1994). Moreover, 70% of the nurses thought that HIV positivity and AIDS were synonymous terms.

In another survey conducted on HIV-related knowledge, attitudes, and practices of health care workers in antenatal health care centers and a hospital in Tamatave, Madagascar (Hentgen, Jaureguiberry, Ramiliaisoa, Andrianantoandro, & Belec, 2002), findings revealed knowledge about transmissibility of HIV infection was poor. Nearly three quarters of the health care staff, composed of physicians, midwives, nurses, medical students, and nursing auxiliaries, believed a child born to an HIV-infected mother would automatically be infected. About two thirds of the health care workers reported never having advised patients to be tested for HIV, and the majority (79%) believed they were at risk of acquiring HIV, mainly through occupational exposure. Negative attitudes toward HIV-infected patients were also noted. These findings suggest that definite gaps exist in knowledge specific to health care providers in India.

Impact of Nursing Education about HIV Knowledge, Attitudes, and Practices

In a cross sectional survey of 266 health care workers from seven rural north India health settings, the majority of participants (91%) perceived themselves as being at high risk of occupational infection. The majority (60%) incorrectly believed that a needle stick injury with an HIV-contaminated needle was certain to result in HIV infection, and 78% believed that PLWH should be nursed separately from other patients. These findings highlight a lack of knowledge and understanding regarding the primary principles underlying standard universal precautions (Kermode, Holmes, Langkham, Thomas, & Gifford, 2005).

There is little disagreement among health care providers that resources need to be targeted to provide education and training to the nursing workforce on HIV prevention and care. However,

research has shown that health care providers are behind the mark in providing such programs. The purpose of this study was to evaluate the effectiveness of a train-the-trainer program in enhancing knowledge of prevention, transmission, treatment of HIV, and counseling among nurses employed in a major government-sponsored medical hospital in Delhi, India. As nursing is the largest professional group involved in the care of HIV-infected patients, findings from this study may be used by schools of nursing, hospitals, and healthcare organizations to educate nurses throughout India on HIV prevention, transmission, treatment, and counseling.

Method

Research Design

A quasi experimental pre-test/post-test design was conducted to evaluate the effect of an educational intervention on nurses' knowledge of HIV. Questionnaires were completed before and after an educational intervention, using train-the-trainer methodology. As a training grant, proper educational and ethical review and acceptance was provided by the medical and nursing administrative heads of the hospital and nursing school.

Setting and Sample

The study was conducted in a tertiary-care public hospital in Delhi, India. Participants consisted of a convenience, self-selected sample of 100 nurses invited to participate by the nursing director of the hospital. The sample included clinical bed-side nurses, head nurses, and administrative nurses who volunteered from a population of 948 nurses. Nurses were eligible to participate if they were employed at the public hospital in Delhi and agreed to participate in the educational intervention in addition to completing the questionnaires before and after the intervention.

Instruments

HIV knowledge was assessed by a dual subset questionnaire developed by the Centers for Disease Control and Prevention (CDC) and later revised and shown to demonstrate concurrent validity (Leake, Nyamathi, & Gelberg, 1997). It was subsequently tested in India with reliability (Cronbach's alpha) scores for the cognitive AIDS knowledge scale at 0.81, while the transmission subscale reliability coefficient was .88 (Nyamathi et al., 2007). The cognitive knowledge portion of the questionnaire contained 10 items, while the transmission component contained 11 items. The 21 items had the following scoring options: (a) *definitely true*, (b) *probably true*, (c) *probably false*, (d) *definitely false*, and (e) *don't know*. Sample statements include: "AIDS can damage the brain," "There is no cure for AIDS at present," and "A person can get AIDS virus infection from shaking hands, touching, or kissing on the cheek of someone who has the AIDS virus." The overall reliability score for AIDS knowledge for the current study was .77. Sociodemographic factors were assessed by collecting information on self-reported age, education, marital status, employment (posting), total years employed as a nurse, and years at most recent employment.

Procedure

The study was conducted from March to October 2005. After receiving information about the study from the nurse administrator and signing an informed consent, the nurses were asked to complete a pre-test questionnaire evaluating their knowledge about HIV. This was then followed by the delivery of the 2-day training program. Post-test evaluation was immediately conducted post intervention.

The intensive HIV clinical training program was developed in consultation with senior faculty members of the All India Institute of Medical Sciences College of Nursing. Ten master trainers

were first trained over a 3-day period by College of Nursing faculty with expertise in HIV. The sessions included extensive modules on HIV/AIDS, as described below, as well as train-the-trainer delivery content related to principles of adult learning, interactive teaching strategies, and delivery specifics on train-the-trainer modalities; this model was previously utilized successfully in India (Nyamathi et al., 2007).

Each of the 10 master trainers subsequently trained a cohort of 10 trainees (a total of 100 trainees) over a 2-day period. The trainees were given a training module covering an overview of HIV, consisting of World Health Organization (WHO) classification terminology, epidemiology of HIV, modes of transmission, natural history of the disease, symptoms of early and late disease, and diagnostic testing. The teaching strategies included lectures with discussion, role play, and small group sessions. The participants addressed the psychosocial implications of being HIV-infected at the individual, family, society, and national levels, as well as nursing management of patients with HIV. Finally, they reviewed and role-played counseling and communication techniques, issues pertaining to stigma, maintaining confidentiality, and ethical principles. Post-test evaluation was performed immediately following the final session with the trainees.

Data Analysis

Descriptive analyses were done to identify frequencies and percentages, means and standard deviations, based on the level of the data. Two-sample *t*-tests, ANOVA, and correlations were used to assess associations between selected sociodemographic factors (age, education, marital status, and clinical specialty) and changes over time in the questionnaire items, which included the cognitive AIDS subscale, the transmission subscale, and the overall AIDS knowledge score. Paired *t*-tests were used to determine if changes from pre-test to post-test were significant.

Results

Sociodemographic Characteristics

Participants ranged between 25 and 58 years of age ($m = 41$, $SD = 8.7$). All participants were female, and most (90%) were married. In relation to their education, 25% had completed higher secondary coursework (class 11), 64% had completed schooling up to senior secondary (10 +2), 10% had completed graduate degrees; few (approximately 1%) had completed post-graduate coursework. Clinical specialty also varied. The majority (83%) received a General Nursing and Midwifery (GNM) Diploma; 15.4% were BSN prepared, and less than 2% had other specialty diplomas in addition to GNM diplomas. The areas in which participants were assigned included the general medical-surgical ward, obstetrics and intensive care wards (44.5%), the emergency department (19%), and the operating room (20.9%); few were from clinics or the nursing office. The mean years of experience at the present work area was 6.9 years ($SD = 4.7$). The mean total nursing work experience of the participants was 16.4 years ($SD = 8.7$) (see Table 1). ANOVA statistics did not show any significance between the sociodemographic factors assessed and changes over time in any of the knowledge assessments.

Cognitive AIDS Knowledge: Pre-test to Post-test

Cognitive AIDS knowledge scores improved significantly overall from pre-test to post-test ($t = 9.04$, $p < .001$) as well as individually in 7 out of 10 items (Table 2). Post-test scores ranged from 82.7 to 90. For example, question 2, "AIDS can damage the brain," was correctly answered by 22% of the respondents in the pre-test questionnaire, whereas the post-test score revealed that 90% of the participants answered it correctly. Question 10, "There is no cure for AIDS at present," was answered correctly by 57.2% of the participants in the pre-test scores and by 82.7% in the post-test scores.

However, this improvement was not seen in all items. Question 5, “A person can be infected with AIDS virus and not have the disease AIDS” was answered correctly by 28.8% of participants in pre-test scores; however, at post-test, only 45.8% of the participants answered it correctly. Thus, this question did not show significant post-test score improvement. Similarly, question 6, “Looking at a person is enough to tell if he or she has AIDS virus,” was answered correctly by 62.3% of the participants in the pre-test scores; post-test scores reached only 69%.

AIDS Transmission Knowledge: Pre-test to Post-test

Overall transmission knowledge improved significantly from pre-test to post-test ($t = 6.56$, $p < .001$). Eleven items were included in the AIDS transmission domain. Participants scored high on the 9 items of the post-test with scores ranging from 80 to 89.

Item 14, “HIV can be transmitted by: Sharing plates, forks, or glasses with someone who has the AIDS virus,” showed marked improvement with 57.2% of the participants correctly responding in the pre-test scores, while 85.4% responded correctly in the post-test scores. However, only moderate improvement was seen in item 18, “HIV can be transmitted by: Being near someone who coughs or sneezes and has AIDS virus,” with 42.7% of the participants responding correctly in the pre-test, while the post-test scores were answered correctly by 65.4%.

HIV-Knowledge Mean Scores

The total knowledge score improved significantly from pre-test to post-test as well ($t = 9.20$, $p < .001$). The pre-test score revealed a mean of 12.8 ($SD = 4.0$) and overall mean post-test score of 16.4 ($SD = 4.15$). The total mean pre-test cognitive knowledge of the participants was 5.6 ($SD = 4.0$), while the post-test score was 7.4 ($SD = 1.94$). The transmission knowledge mean pre-test of the participants was 7.1 ($SD = 3.05$), while the mean post-test score of the participants was 9.03 ($SD = 2.64$). Thus, there was a significant knowledge gain for the participants in the transmission domain.

Discussion

In a country with more than 2.5 million people infected with HIV, there is a great need to educate health care providers about the transmission and treatment of this virus. Research has shown that most health care professionals, including nurses, are very limited in their understanding of HIV transmission and in the care of PLWH (Kermode et al., 2005; Menon & Bharucha, 1994). This study was designed to increase nurses' knowledge of HIV and to evaluate if a train-the-trainer program would be an effective way to educate large numbers of nurses. The findings revealed that there was a significant gain in overall HIV knowledge as well as significant gains in cognitive and transmission knowledge of HIV in all cohorts who participated in the education intervention. However, post-test scores did not reach optimum levels for several content areas.

In the area of cognitive HIV knowledge, post-test scores revealed that participants scored well on 5 out of 10 items. Findings revealed that while nurses were aware of the etiologic basis for the disease and the immunologic disturbance it creates, few were aware that teenagers are vulnerable to HIV, that one cannot tell if a person has HIV by looking at them, or whether a vaccine was currently available to protect one against HIV. Fewer nurses (46%–55%) correctly responded that a person could be infected with the virus and not have AIDS or that a person with AIDS can look or feel well. Transmission scores from pre-test to post-test were generally higher than on pre-test.

The findings revealed that these nurses became significantly more knowledgeable about HIV as a result of the train-the-trainer program. Except for a few items, mean knowledge of HIV at baseline was clearly low as more than half of the items in both knowledge components received a pre-test score of less than 60%. However upon post-test, these scores improved significantly. Clearly, a train-the-trainer model is an efficient educational strategy that can assist health care providers with communicating information about the disease in terms of prevention, signs and symptoms of HIV, clinical manifestations, counseling, and impact of the disease. The findings of this study indicate that more education about HIV is needed for nurses through training programs that focus on prevention of HIV transmission and the treatment of PLWH. It is also important to evaluate different methods of education, or a combination of methods, to most efficiently transfer this knowledge. Cost-effective analysis would also be important in terms of train-the-trainer modalities versus the more traditional models.

While not investigated in this study, research indicates that the education of staff nurses may lead to the development of positive attitudes, which should translate to greater quality of care for PLWH and the public. Research has shown that the negative attitudes of health care personnel lead to stigma against those with the disease, thereby negatively affecting access to health care for these patients (Deb, Mukherjee, & Acharya, 2004; Hentgen et al., 2002; Williams et al., 2006). As nurses comprise a major work force in any health care facility, their knowledge and positive attitudes play a major role in the prevention and treatment of HIV. Thus, additional training could lead to changes in attitudes of health care personnel and successful prevention programs in the community, which would play a major role in curbing the epidemic.

It is interesting to note that there was no observed relationship between knowledge scores, experience, and practice location of the participants. This revealed that the lack of knowledge of HIV disease was wide spread throughout the nursing specialties. Thus, nurse-led training programs can be effective in preparing the nursing workforce. Conducting nursing education programs can provide multiple benefits, as India has one of the higher levels of HIV infection in the world along with significant challenges experienced by developing nations in responding to this crisis.

Limitations

This was a single-center study and the sample size was small. The sampling strategy used a convenience methodology; thus there is a limited ability to generalize the results of this study. Also, this study did not evaluate the effectiveness of the train-the-trainer methodology over time. Follow-up studies are needed to evaluate evidence of the long-term effectiveness of this type of training program.

Conclusion

Prevention of HIV is complex, requiring multiple strategies to reach more remote high-risk people. Nurses play a major role in health care delivery systems, thus education of nurses can increase the number of health care providers prepared to educate the public about HIV transmission prevention. In particular, there is a need to impart focused training on prevention counseling regarding HIV, keeping in mind the rising incidence of HIV infection in India. The training should also be supplemented with continued education on HIV and related issues. In the future, it is suggested that longitudinal studies be conducted to track the knowledge and attitudes of nurses in order to determine and strengthen the efficacy of the curriculum.

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Table 1

Socio-demographics of the Sample

	<i>M</i>	<i>SD</i>
Age	41.18	8.69
Marital Status		
Married	90%	
Single	10%	
Education Levels		
Higher Secondary Senior	24%	
Secondary Graduate	64%	
Graduate	10%	
Post Graduate	1%	
Professional Education		
GNM	82.7%	
BSN	15.3%	
Other Diplomas	2%	
Posting Location		
General Wards	44.5%	
ER	19%	
ICU	10%	
OR	20.9%	
Clinic	3.6%	
Nursing Office	1.8%	
Years Experience		
In Present Area	6.86	4.74
As a Nurse	16.37	8.65

Table 2**Cognitive and Transmission Knowledge Pre-test and Post-test Scores**

Cognitive AIDS Knowledge		Correct Responses	
		Pre-test %	Post-test %
1.	AIDS can reduce body's natural protection (yes)	80.0	87.2
2.	AIDS can damage the brain (yes)	22.5	90.0
3.	AIDS is an infectious disease caused by virus (yes)	86.4	85.4
4.	Teenagers cannot get AIDS (no)	75.6	73.6
5.	A person can be infected with AIDS virus and not have disease (yes)	28.8	45.8
6.	Looking at a person is enough to tell if they have AIDS (no)	62.3	69.0
7.	Person with AIDS virus can look and feel well (yes)	32.7	55.4
8.	Pregnant woman may give the virus to her baby (yes)	71.8	84.7
9.	There is a vaccine available to protect against AIDS virus (no)	49.0	71.8
10.	There is no cure for AIDS at present (yes)	57.2	82.7
Total Cognitive Knowledge Score		<i>M (SD)</i> 5.6 (4.0)	<i>M (SD)</i> 7.4 (1.94)
AIDS Transmission Knowledge		Pre-test %	Post-test %
One can get AIDS by:			
11.	Living near a home or hospital for AIDS patients (no)	67.4	80.0
12.	Working with someone with AIDS virus (no)	63.6	80.0
13.	Eating in a restaurant where the cook has AIDS virus (no)	68.1	79.0
14.	Shaking hands, touching or kissing someone on the cheek (no)	79.8	89.0
15.	Sharing plates, forks or glasses with someone who has AIDS (no)	57.2	85.4
16.	Using public toilets (no)	46.3	80.0
17.	Sharing needles for drug use with someone who has AIDS (yes)	77.2	88.1
18.	Being near someone who coughs or sneezes and has AIDS (no)	42.7	65.4
19.	Attending school with a child who has AIDS (no)	70.9	85.4
20.	Mosquitoes or other insects (no)	62.7	83.6
21.	Having sex with a person who has the AIDS virus (yes)	82.7	87.2
Total AIDS Transmission Knowledge Score		<i>M (SD)</i> 7.18 (3.05)	<i>M (SD)</i> 9.03 (2.65)