
Provider Behavior

HIV-Related Avoidance and Universal Precaution in Medical Settings: Opportunities to Intervene

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Objective. To determine the association between adherence to universal precaution (UP) and avoidance attitudes toward patients living with HIV/AIDS (PLH) among service providers.

Data Sources/Setting. A total of 1,760 health service providers were randomly selected from 40 county hospitals in two provinces of China.

Study Design. A self-administered questionnaire was used to collect demographic characteristics, UP knowledge and training, UP adherence, availability of UP supplies at work, and avoidance attitudes toward PLH in a cross-sectional survey.

Data Analysis. A series of regression models were used to examine associations among the UP-related factors and their relationship to avoidance attitudes toward PLH.

Principal Findings. UP training was associated with better knowledge of and adherence to UP and perceived availability of UP supplies in hospitals. UP training, knowledge, and adherence were significantly associated with avoidance attitudes toward PLH in medical practice. Being a nurse was also related to HIV-related avoidance.

Conclusion. UP promotion campaigns, including in-service training and reinforcement of UP adherence, could play an important role in the battle against HIV-related avoidance in medical settings. Intervention programs should focus on not only individual providers' attitudes and behaviors but also on structural support for norms shifts in the medical community.

Key Words. HIV/AIDS, stigma, universal precaution, service provider, China

HIV-related stigma is prevalent in medical settings worldwide and is a major barrier to effective responses to the HIV/AIDS epidemic (Foreman, Lyra, and Breinbauer 2003; Piot 2006; Mahajan et al. 2008). Service providers' stigmatizing attitudes and avoidance behaviors toward patients living with HIV/AIDS (PLH) discourage people from seeking HIV testing and counseling, participating in prevention programs, accessing HIV treatment, and

adhering to antiretroviral therapies (Kalichman and Simbayi 2003; UNAIDS 2003; Varas-Diaz, Serrano-Garcia, and Toro-Alfonso 2005).

Previous studies have demonstrated an association between service providers' discrimination against HIV patients and their fear of contracting HIV at work (Herek, Capitanio, and Widaman 2002; Li et al. 2007a; Hossain and Kippax 2009). Shisana et al.'s study (2003) of the impact of HIV/AIDS in health care settings demonstrated that workers were reluctant to provide services because of concerns about occupational infection. A more recent study revealed that service providers' level of stigmatized attitudes toward PLH increased with the increment of irrational fear about HIV transmission (Hossain and Kippax 2009).

To reduce the risk of occupational exposures to HIV and other blood-borne diseases in health care settings, the U.S. Centers for Disease Control and Prevention issued guidelines for the use of universal precautions (UP) during patient care since the mid-1980s (Centers for Disease Control and Prevention 1987, 1988). The guidelines emphasize that health care providers should consider all patients as potentially infected with HIV or other blood-borne pathogens and to adhere rigorously to infection control precautions (Centers for Disease Control and Prevention 1988). Recommended precautions include the immediate disposal of needles and other sharp objects after use in special containers and the use of appropriate protective barriers for blood and body fluid exposures, including gloves, masks, gowns, and protective eyewear. In addition, UP practices are meant to be used in conjunction with routine infection control practices such as hand washing (Harris and Nicolai 2010). Numerous studies have shown that implementation of UP can successfully reduce the risk of occupational exposure to blood and bodily fluids (Wong et al. 1991; Beekmann et al. 1994; Sridhar et al. 2004). In response to the increased concern about occupational exposure and the rising number of HIV/AIDS cases, the China Ministry of Health also issued guidelines on UP in 2004.

Despite the enactment of regulations, UP procedures are not fully practiced and reinforced worldwide. In a study of AIDS-related precautionary behaviors

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among emergency medical technicians, Smyser, Bryce, and Joseph (1990) found that less than 40 percent of respondents reported always wearing gloves when treating a bleeding patient, and only one out of five respondents followed the CDC-recommended safe procedure of not recapping needles after use. In an observational study in Chile, Ferrer et al. (2009) reported that health care workers used UP inconsistently, with a lack of supplies contributing to the failure of UP adherence.

Recent estimates show that 740,000 people lived with HIV in China in 2009 (Ministry of Health of the People's Republic of China 2010). The rapidly spreading HIV/AIDS epidemic has made a huge impact on the health care system in the country. With the increasing demand of services, lack of HIV/AIDS-related training and health resources (Wen 2009), the challenges associated with UP are greater in China. The rate of self-reported noncompliance with glove utilization and hand hygiene among obstetricians and gynecologists was 68 percent in the rural area of Anhui, China (Ji, Yin, and Chen 2005). In Changsha, China, only 11 percent of student nurses used gloves during high exposure risk procedures (Wang et al. 2003). Moreover, in a qualitative study previously conducted by this research team, we showed that many providers exhibited a lack of awareness of and misconceptions about UP in medical practice (Lin et al. 2008; Wu et al. 2008).

Based on our previous findings, we speculate that a lack of UP training, knowledge, and supplies in hospitals in China might be associated with fear of HIV infection and aggravate HIV-related avoidance behaviors in medical settings. This hypothesis is supported by a study from Kermodé (2004), wherein safer injection practices resulted in health care workers not only feeling protected from occupational HIV infection but also made them less likely to discriminate against patients with HIV/AIDS. To further explore the relationship between UP and HIV-related stigma in health care settings, we explored the association of providers' UP knowledge, adherence, and perceived availability of UP supplies in China with HIV-related avoidance attitudes to serve PLH in hospitals. It was hypothesized that providers' knowledge of UP and compliance to UP guidelines would be associated with a lower level of avoidance attitudes to PLH at work.

METHODS

Study Sites and Sampling

This study was conducted in 40 county-level hospitals in two provinces of China during October 2008 to December 2009. In China, medical care and

services are delivered hierarchically through hospitals and clinics at provincial, city, county, township, and village levels (Davis and Chapman 2002). County hospitals are in the middle of this hierarchy and are the most advanced local hospitals that are easily accessible to most Chinese residents (Brown and Theoharides 2009). Currently in China, for each county, there is a County Health Bureau, and a government-run People's Hospital, which serves a population size ranging from 200,000 to 450,000 each. A typical county hospital is staffed by 200–450 service providers and has 140–400 hospital beds. For this study, 40 hospitals were randomly selected from a total of 214 country-level hospitals in the two provinces. These hospitals have comparable numbers of providers, patient beds, and average patient visits.

The second stage of sampling involved randomly selecting service providers from each hospital. The sampling process at each county hospital started with obtaining a publicly available hospital staff roster. A systematic sampling approach was applied within each hospital. We purposely selected providers who provide direct services to patients, including doctors, nurses, and lab technicians. In order to be eligible for the study, potential participants had to (1) be at least 18 years old; (2) work at the participating hospitals; and (3) voluntarily agree to participate and sign the informed consent. Forty-four service providers were randomly selected from the 40 participating hospitals, resulting in a total of 1,760 service providers in the study.

Procedure

To recruit participants, project recruiters approached the selected providers with standardized scripts to ensure all ethical issues were covered. On average, the refusal rate was about 5 percent across all hospitals. Before the data were collected, project staff explained the purpose of the study, procedures, potential risks and benefits, and obtained written informed consent from the participants. Participants filled out the paper-and-pencil survey in a private room, although a trained interviewer was available to answer questions during the assessment. Each participant was paid 50 yuan (U.S.\$7.50) for his/her participation in the survey. All study documents and procedures were approved by the Institutional Review Boards at the University of California, Los Angeles and the Chinese Center for Disease Control and Prevention (CDC).

Measures

The self-administered questionnaire consisted of 167 questions, which took an average of 30–45 minutes to complete. The questions covered various topics,

including demographics, medical education and experience, and UP-related training and knowledge. The survey also assessed participants' perceived availability of UP supplies in hospitals, their adherence to UP at work, as well as their attitude and behavior toward PLH.

HIV-related *avoidance attitude* was measured by providers' responses to a set of hypothetical situations they might encounter during work. The statement items, which were modified from Herek's (1999) work, included providers' willingness to provide service in eight different situations involving potential contact with a person with HIV. Example statements in this scale included, "If HIV-positive patients visit the hospital, you are willing to provide all service needed," "If your supervisor asked you to do a physical examination of a known HIV-positive patient, you would be willing to do so," and "If you worked with HIV-positive patients, you would wish that you could change your job so that you would not have to deal with them." The responses to each statement ranged from 1 (strongly agree) to 5 (strongly disagree). Some items were reverse-scored so that a higher score indicated a higher level of avoidance attitude toward providing service to PLH. The interitem reliability of the scale is high (Cronbach's $\alpha = 0.84$).

Provider's *UP knowledge* was measured using 11 questions, which covered the topics of the situations to which UP should apply; the usage method of gloves, masks, and goggles; the disposal of used syringes; the disinfection method of contaminated areas; and prophylaxis of occupational exposure. For each question, responses were coded 1 (correct) or 0 (incorrect or do not know). The index of UP knowledge was calculated by summing all 11 items, with a higher score indicating better knowledge of UPs.

To measure providers' *UP adherence* in their daily work, we adopted items from a questionnaire developed by Chan et al. (2002). The measure contained 13 items that addressed the frequency of providers' particular behaviors at work, such as "I wear gloves when there is a possibility of being exposed to body fluids or blood products," "I change gloves between patients," "I wash my hands immediately after removal of gloves," and "I wear a disposable facemask whenever there is a possibility of a splash or splatter." Responses to these items ranged from 0 (never) to 4 (always). A higher score indicates a higher level of adherence to UP procedures (Cronbach's $\alpha = 0.77$).

To measure providers' perceived availability of *UP supplies* in the hospital, we used a five-item scale that was used in our previous studies (Li et al. 2008). Participants were asked if there were always (1) sterile rubber gloves, (2) sterile needles, (3) disinfectant, (4) disposal containers, and (5) a working autoclave available at the hospital when they were needed for work. This

measure was constructed by summing the positive (yes) responses, with a higher number indicating more favorable assessment in the availability of UP supplies in the hospital (Cronbach's $\alpha = 0.72$).

We also collected respondents' demographic and professional information, including age, gender, medical training, profession, and if they had received any training in UP.

Data Analysis

SAS statistical software (SAS Institute Inc., Cary, NC, USA) was used for all analyses. We descriptively analyzed the distribution of age, gender, education, profession, and training in UP and their relationships with UP knowledge, UP supplies, UP adherence, and HIV-related avoidance. Furthermore, three multiple regression analyses were performed with the UP knowledge, UP adherence, and avoidance attitude, controlling for the simultaneous effects of participants' training in UP, perceived availability of UP supplies in the hospital, as well as demographic and background characteristics. Standardized regression coefficients and their significance levels are reported.

RESULTS

Demographics

A total of 1,760 service providers were recruited for this study at a female-to-male ratio of 67–33 percent. The age range was 20–68 years with a mean of 36 ± 8.3 . Approximately 42 percent of the participants were between 31 to 40 years of age. About 49.2 percent of the participants were doctors, 42.8 percent were nurses, and 8 percent were lab technicians. At the time of survey, 41.7 percent of the participants had received 4 years of medical education or higher. Slightly more than half of participants (54 percent) had previously received training in UP. The background characteristics of the study sample are summarized in Table 1.

UP Training, Knowledge, and Adherence

The means and standard deviations for availability of UP supplies, UP knowledge, UP adherence, and avoidance attitudes, respectively, are also presented in Table 1. The adherence to UP was reported fairly high with a mean score equaling 32.7. On average, service providers in this study correctly answered seven out of 11 questions testing their UP knowledge. Also, the majority of participants (82.7 percent) reported that they had enough sterile rubber

Table 1: Description of Study Sample

	<i>Number</i>	<i>%</i>
Age (years)		
18–30	511	29.1
31–40	748	42.5
41–50	396	22.5
51 or older	104	5.9
Gender		
Female	1,188	67.5
Male	572	32.5
Medical training		
Vocational school or lower	386	21.9
Associate medical degree	640	36.4
Medical degree or higher	734	41.7
Profession		
Doctor	866	49.2
Nurse	754	42.8
Lab technician	140	8.0
Received training in UP		
Yes	952	54.1
No	808	45.9
<i>Scales</i>	<i>Mean</i>	<i>SD</i>
UP supplies (1–5)	4.7	0.8
UP knowledge (1–11)	7.0	1.5
UP adherence (0–39)	32.7	4.9
Avoidance attitude (1–40)	18.6	4.2

UP, universal precaution.

gloves, sterile needles, disinfectant, disposal containers, and working autoclave available at the hospital (not shown in table). Regarding noncompliance to UP, providers ranked insufficient precaution supplies (44.9 percent), lack of UP knowledge/training (40.2 percent), and time constraints (36.6 percent) as their top three reasons for failing to adhere.

Table 2 presents perceived availability of UP supplies, UP knowledge, and UP adherence by background characteristics, including UP training. Participants who were 50 years and older reported relatively poorer knowledge of UP ($p < .0002$) and showed a lower level of adherence to UP ($p = .0030$) compared with providers of other age groups. Female providers perceived more availability of UP supply in hospital ($p < .0001$) and had a higher score of UP knowledge ($p = .0003$) and adherence ($p = .0301$) than their male counterparts. Providers with the lowest level of medical training reported a higher

level of avoidance tendency toward PLH, compared with those better educated ($p = .0130$). Lab technicians had a higher level of UP knowledge than doctors and nurses ($p < .0001$). Not surprisingly, previous training in UP was significantly associated with perceived availability of UP supplies ($p < .0001$), knowledge ($p < .0001$), and adherence ($p < .0001$) to UP procedure.

Predicting HIV-Related Avoidance with UP-Related Factors

Nurses reported more availability of UP supplies in hospital ($p < .002$) compared with other professions (Table 2), and they also showed the highest level of HIV-related avoidance among all profession categories. UP training was negatively related to avoidance attitudes toward PLH ($p < .0001$).

Results from multiple regression analyses are presented in Table 3. The first column of the table summarizes standardized estimates for predicting UP

Table 2: Description of Perceived UP Supplies, UP Knowledge, UP Adherence, and Avoidance Attitude by Demographic and Background Characteristics

	<i>UP Supplies</i>		<i>UP Knowledge</i>		<i>UP Adherence</i>		<i>Avoidance Attitude</i>	
	<i>Mean</i>	<i>p</i>	<i>Mean</i>	<i>p</i>	<i>Mean</i>	<i>p</i>	<i>Mean</i>	<i>p</i>
Age (years)								
18-30	4.68	.1737	6.84	.0002	32.53	.2004	18.87	.0030
31-40	4.67		7.16		32.60		18.22	
41-50	4.77		7.02		33.17		18.99	
51 or older	4.76		6.65		32.86		17.98	
Gender								
Female	4.75	<.0001	7.09	.0003	32.90	.0301	18.67	.1520
Male	4.58		6.82		32.35		18.36	
Medical training								
Vocational school or lower	4.83	<.0001	6.92	.0461	32.93	.0370	19.04	.0130
Associate medical degree	4.77		7.13		33.00		18.25	
Medical degree or higher	4.57		6.96		32.37		18.63	
Profession								
Doctor	4.63	.0002	6.82	<.0001	32.80	.4657	18.39	.0127
Nurse	4.79		7.17		32.71		18.89	
Lab technician	4.64		7.29		32.26		17.97	
Received training in UP								
Yes	4.79	<.0001	7.22	<.0001	32.53	<.0001	18.15	<.0001
No	4.60		6.75		31.77		19.06	

UP, universal precaution.

Table 3: Standardized Estimation Result from Linear Regressions

<i>Parameter</i>	<i>UP Knowledge</i>	<i>UP Adherence</i>	<i>Avoidance Attitude</i>
Age	- 0.0045	- 0.0092	0.0222
Female	0.0468	0.0482	0.0252
Having medical degree	0.0583	- 0.0440	0.0539
Being a nurse	0.0790*	- 0.1085 [‡]	0.1053 [‡]
Training in UP	0.1498 [§]	0.1385 [§]	- 0.0757 [‡]
UP supplies	- 0.0160	0.2429 [§]	0.0322
UP knowledge		0.0979 [§]	- 0.0666 [‡]
UP adherence			- 0.1732 [§]
Overall variance	0.0342	0.1062	0.0912

* $p < .05$; [‡] $p < .01$; [‡] $p < .001$; [§] $p < .0001$.

UP, universal precaution.

knowledge, controlling for background characteristics, UP training, and availability of UP supplies. Nurses ($\beta = 0.08$; $p < .05$) and those who had received UP training ($\beta = 0.15$; $p < .0001$) reported higher level of UP knowledge. The second column presents the regression model of UP adherence. In spite of more training received and more knowledge of UP, nurses were less likely to be adherent to UP when other variables were controlled ($\beta = -0.11$; $p < .001$). Those who previously received UP training ($\beta = 0.14$; $p < .0001$) and had more UP knowledge ($\beta = 0.10$; $p < .0001$) displayed a higher level of adherence to UP. Better perceived availability of UP supplies was a strong predictor for UP adherence in the model ($\beta = 0.24$; $p < .0001$). Multiple regression of HIV-related avoidance toward PLH is shown in the third column of Table 3. Nurses reported a higher level of avoidance when other variables were held constant ($\beta = 0.11$; $p < .01$). UP training ($\beta = -0.07$; $p < .01$) and knowledge ($\beta = -0.08$; $p < .01$) were negatively related to HIV-related avoidance. Providers who reported better adherence to UP were associated with a lower level of avoidance tendency toward PLH ($\beta = -0.17$; $p < .0001$). The proportion of variance in the UP knowledge, UP adherence, and avoidance attitude, which can be explained by the independent variables in the models, was 3.42, 10.6 and 9.1 percent, respectively (Table 3).

DISCUSSION

There will be an estimated 740,000 people living with HIV in China by the end of 2009 (The International Federation's support to the Red Cross Society

of China 2009). Service providers' stigmatizing behaviors in medical settings will impact the treatment adherence and health outcomes of many PLH. As the demand for HIV treatment and care increases, service providers in China will be critical to delivering adequate services and care. Stigma reduction interventions have rapidly become an urgent task for the increasing demands for HIV care and prevention. In this study, we identified significant relationships between providers' avoidance attitudes and their training, knowledge, and practice in UP at work. Although the association has been hypothesized previously, this study is the first to systematically investigate the relationships between UP and stigmatizing behavior. Our findings shed light on the understanding of HIV-related avoidance among service providers, showing that the enhancement of UP could lead to the reduction of HIV-related avoidance behavior and increase the quality of service for PLH in medical settings.

Implementation of UP is not the sole responsibility of service providers. Institutional factors for UP, including clear working guidelines for standard operational procedures and better access to UP supplies, are essential components in UP compliance. From this and previous studies, we discovered that, although most HIV stigma reduction strategies intervene at the individual level, providers' behaviors are clearly influenced by structural barriers (Li et al. 2007a, 2008). The accessibility and availability of UP supplies at work are necessary conditions for providers complying with UP guidelines in their medical practice. Aside from logistical reasons, good institutional support would also promote a positive psychological state and reduce service providers' perceived negative consequence of caring for PLH and minimizing their internalized shame (Claxton, Catalan, and Burgess 1998; Lin et al. 2008). Our study provides further evidence that effective structural level interventions are crucial in the promotion of UP adherence and reduction of HIV-related avoidance behavior among service providers.

Our findings also suggest that the removal of structural barriers alone may not be sufficient for individual behavioral changes. Studies have found that service providers in China often lack information about standard precaution practices in the workplace (Ji, Yin, and Chen 2005), and many of the existing norms in hospitals contradict safe practices (e.g., directing nurses to remove needles from syringes after giving an injection or taking blood) (Wu et al. 2008). To protect themselves, service providers tend to judge the risk of patients based on their appearance and take precautionary measures accordingly. Such misconception and practice have not only become a serious obstruction to effective implementation of UP (Elford and Cockcroft 1991) but also leads to the avoidance of patients suspected of being at high risk or

infected and to the support of coercive policies (Li et al. 2007b). Training of service providers in UP guidelines is one of the important ways to improve compliance. The rationale of using UP can be framed as a necessary protection against *all* infectious diseases, including STDs and HIV, and it should be emphasized that all patients should be treated as potentially infected with HIV or other blood-borne pathogens. This study calls for effective in-service training for service providers to address psychosocial and motivational aspects of UP non-compliance and to focus on a norms shift from avoidance of patients as a way of self-protection to promoting UP adherence for a safer medical community.

Interestingly, we found that nurses in this study demonstrated better knowledge of UP than doctors, but they were less likely to be adherent to UP procedures in their daily work and reported a higher level of avoidance against PLH. To explain such a finding, one must take the structure of health care facilities into account. In China, the contact time between doctors and patients is minimal. Doctors are mainly responsible for writing prescriptions, and they usually visit hospitalized patients only once or twice a day for brief periods of time. Nurses, on the contrary, provide care services that involve a lot of bodily contact. Prolonged and frequent care of PLH could become a heavy burden for nurses and put them under emotional and psychological distress. The close contact with patients and related psychological burden perhaps mediate the relationship between UP knowledge and compliance as well as avoidance attitudes. This ambivalence in nurses has also been found in other studies in China and other countries (e.g., Chen, Han, and Holzemer 2004; Smit 2005; Delobelle et al. 2009). The findings may also reflect the complexity of associations explored in the regression models. Possible interactions among predictors in the model often make interpretations vague and complex. More studies are needed to explore the potential interrelationships. Future UP-related training and stigma reduction programs for service providers should be tailored for different professions with distinct challenges and experiences with PLH.

Despite these findings, there are some limitations to this study. First, we used a cross-sectional design that limited our ability to make causal inferences. Second, the study relied entirely on self-reported data. We assessed the availability of UP supplies based on self-report without institutional indicators, such as actual material equipped in each hospital; thus, concerns of recall accuracy must be considered. Likewise, we measured UP adherence and avoidance attitude by questionnaire as opposed to observation. The self-reported result might be subject to social desirability bias. Despite these limitations, our findings clearly identified an essential link between UP and stigmatizing behaviors against PLH in health care settings.

In conclusion, this study identified an important association between HIV-related avoidance behavior and UP adherence among service providers. Future interventions should address safer medical practice by emphasizing UP procedures for protecting providers from occupational exposure to HIV and other blood-borne infections. We anticipate that, with the evidence from this study, such an intervention has great potential to increase UP awareness and adherence, potentially leading to a decrease in unrealistic fear of infection at work and avoidance of PLH in medical practice.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

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