

ORIGINAL ARTICLE**Survey of Health Workers Compliance with Universal Precautions in Jimma Hospital****Asrat Demissie, BScN, MScN¹ and Tamrat Assefa, BScN¹**

ABSTRACT: *A descriptive study to identify health care workers compliance with universal precautions was undertaken during February 1999, in Jimma hospital, Ethiopia. One hundred and twenty two health care workers participated in the study. Results indicated that the low, or high degree of compliance with various category-specific universal precaution protocols, varies significantly between various work settings and rank of health care workers. Some health care workers failed to comply consistently with universal precaution guidelines. When evaluating the overall rate of compliance according to work setting and job title the pediatric and medical wards and physician plus intern group had the lowest scores for most universal precaution techniques. Other demographic variables showed no influence on compliance as measured by this study.*

The study identified some of the reasons health care workers give for failing to take precautions. Recommendations include the need for some concrete steps to be taken by hospital administrators to increase the availability and accessibility of protective materials used in the work place.

INTRODUCTION

Blood-borne pathogens, particularly human immune deficiency virus (HIV) and hepatitis B virus (HBV) have been identified as threats to health care workers (1). To counter this threat, the Occupational Safety and Health Administration (OSHA) issued definitive guidelines on universal precaution (UP), delineating the responsibilities of both the employer and HCW in avoiding exposure to body fluids, which could serve as vectors for transmission of disease (2,3). Employers were mandated to provide two critical

elements: education of employees in the use of UP and provision of the protective equipment needed to implement the system. Occupational transmission of HIV and HBV infections are preventable by adapting UP to prevent parenteral, mucous membrane and non-intact skin exposure of health care workers (HCWs) by utilizing appropriate combination of good laboratory practices, personal protective devices, containment equipment, immunization with HBV vaccine and other measures (4-6).

Many studies in the past 8 years reveal that HCWs failed to follow UP guideline.

¹School of Nursing, Jimma Institute of Health Sciences, P. O. Box 378, Jimma, Ethiopia.

In a study on compliance rates, more than 2 of the 4 aspects of UP protocols (barrier precautions, hand washing, handling of sharp instruments and avoidance of unprotected mouth to mouth resuscitation) were assessed simultaneously (7). To judge compliance rates, researchers have used two types of tools: direct observation and retrospective written surveys.

Kelen *et al.* (8) studied an emergency room setting and scored overall compliance with UP as 44%, reporting the observed staff did not use appropriate precautions with 2275 patients whose HIV status was unknown. Another study showed that 56% of HCW took inadequate precautions even when dealing with known AIDS patients (9,10). Becker (11) gathered data on recapping of needles; as needle stick exposure to blood-borne pathogens is currently the source of most serious exposure. Stotka *et al.* delineated the frequency of exposure of HCW in acute care medical wards in two large hospitals. They found that hand exposure to blood during intravenous procedures; manipulations and blood glucose tests were the most common problems. In 75% of the exposures, failure to use gloves was noted (12). McNabb & Keller conducted an in depth survey of nurses and risk-taking in regard to HIV transmission. Despite the fact that nurses had adequate knowledge and beliefs about HIV and UP protocols, 76% of the respondents reported at least one unprotected exposure to blood and body fluids in the week preceding their completion of the questionnaire (9). In another study, Wiley *et al.* found that 20% (64/323) of nurses surveyed believed they had been exposed, through mucous membranes or broken skin, to blood and body fluids of an HIV-positive patient (13). Burtis & Evangelisti noted that 40%-60% of nurses surveyed at their institutions used UP inappropriately in caring for known

AIDS patients by the use of double gloving or overuse of other barrier precautions (14).

Many studies have tried to identify how knowledge levels are related to behaviors (9,13-15). These studies represent results of educating health workers into compliance. Other groups of studies have aimed at identification of situations where exposure most often occurs, so that education, institutional policy and the provision of supplies can be altered to counter the threat (9,12,15).

In Ethiopia, no studies have been done on how the problem of UP practice in various settings. Evaluation of compliance rates, as an important facet of monitoring the effectiveness of employee education about UP, are important to hospital administration, infection control, employee health and education departments.

The purpose of this study was to determine the rates of compliance of health care workers with universal precaution protocols. It also aims to identify whether the degree of compliance is influenced by either the work setting or job rank; and to explore problem areas that are associated with non-compliant behaviors regarding the use of UP among HCWs.

MATERIALS AND METHODS

This survey was conducted at an Ethiopian teaching and regional referral hospital located in a southwestern city of Jimma. At the time of the survey, the hospital had 209 beds with an occupancy rate of 28.9%. According to the hospital health records, a total of 19 HIV-seropositive patients were hospitalized during the time of the survey between February and March 1999.

One hundred twenty two HCWs with age ranges of 21-46 years (mean=30.4, SD=5.6) were enrolled into the study. Study participants were drawn from all work settings in the hospital. The work

settings were categorized into five groups by combining them based on their geographic proximity and similarities in the type of services provided to clients.

Survey started after permission from the hospital authorities was obtained and consents from the study subjects secured. Data was collected using a two-part questionnaire developed for the study. The first part requested demographic information. The second section was designed in accordance with the 1987/1988 CDC recommendations for the use of UP to prevent the transmission of blood borne pathogens in health care settings. This section has a checklist format and addresses the use of hand washing; barrier precautions; proper disposal of needles and other sharp instruments; use of ventilation equipment to avoid mouth to mouth contact during resuscitation efforts and proper handling of linen, surfaces and fluids soiled with blood.

Content and construct validity of the questions have been evaluated by two clinical researchers who have worked extensively with HIV-related problems. After their suggested modifications were made, these judges agreed that the instrument adequately measured components of UP. The instrument was also reviewed for clarity by a group of health assistants and nurses from the participating hospital, who reported no difficulty understanding and responding to the questions. Given this consultation process and past successes with the use of this type of instrument, the measures were judged to have adequate validity.

Data entry and analysis were done using EPI INFO and SPSS computer statistical packages. Data were analyzed to describe the demographic characteristics of the sample. Subgroups were examined for trends by relating and testing such parameters as age, sex, work setting, job title and year of service with reported rate

of compliance using a chi-square statistical method. P-values were adjusted to the 0.01 level for the specific techniques listed under the five major categories of UP protocols.

RESULTS

The work settings surveyed were 2 medical wards, 2 surgical wards, major and minor operation rooms, obstetrics and gynecology wards, pediatrics ward, and out patient department (OPD) including the laboratory (Lab) and specialized clinics (ophthalmic, dental, dermatology, and psychiatry). The subjects surveyed were all HCWs who have direct contact with patients and their blood and other body fluids and included health assistants, nurses, physicians (plus interns), and laboratory technicians. Among the subjects surveyed, 26% (n=32) had served for ≤ 1 year; 27% (n=33) for 2 to 5 years; 18% (n=22) for 6 to 10 years, and 29% (n=35) for >10 years.

The socio-demographic aspects of the participating health workers is depicted in Table 1.

Hand Washing: Respondents were asked about their hand washing practices in their work setting. When the responses were analyzed for the entire sample it was found that 89% (n=108) said that they always washed their hands after contamination of the skin and 78% (n=95) after removal of gloves (Table 2).

Comparative assessment of participants' responses on hand-washing practices indicated a significant difference across the respondents' work settings and job titles. The response rate for hand-washing between patients ($\chi^2=21.66$, df=4, $p<0.01$) was substantially higher for those working in OPD and Lab (Table 3). Similarly, marked statistical difference was observed between the respondents job title, where the highest proportion of lab. technicians reported compliance with hand-washing

between patients ($\chi^2=26.9$, $df=3$, $p<0.01$) and after removal of gloves ($\chi^2=21.26$, $df=3$, $p<0.01$) [Table 4].

Barrier Precautions: A majority of respondents 65% ($n=79$) from the entire sample reported compliance with wearing gloves whenever there was a possibility of exposure to blood or body fluids. Nevertheless, fewer respondents 35% ($n=43$) reported wearing gloves for performing venipuncture and finger prick blood sampling. The reported compliance rate was least 22% ($n=27$) for use of additional barriers (mask, eyewear, gown) during any procedure that was likely to generate splashes of blood or other body fluids (Table 2).

As shown in Table 3, among the subjects in various work settings, those HCWs in the surgical units were found most compliant with the use of gloves in situations where the HCW judged hand contamination with blood or body fluids might occur ($\chi^2=14.4$, $df=4$, $p<0.01$). With regard to compliance with the use of gloves for performing venipuncture and finger prick, a significant difference was observed between respondents' work settings, where a high proportion of the subjects in OPD and Lab reported compliance 64%, $n=18$ ($\chi^2=18.17$, $df=4$, $p<0.01$). In general, compliance with the use of additional barrier protection (mask, eyewear, and gown) was uniformly low among all HCWs in all work settings. As shown in Table 3, only 40% ($n=12$) of respondents in the Obstetric & Gynecologic units reported that they always used barrier protection during any procedure. This was statistically significant ($\chi^2=13.44$, $df=4$, $p<0.01$).

Reported compliance rates with the use of barrier protection on the basis of job title were also shown to be statistically significant ($p<0.01$). A high compliance rate was observed with nurses ($\chi^2=15.34$, $df=3$, $p<0.01$) for wearing gloves whenever there was a possibility of exposure to blood

or body fluids. The use of gloves for performing venipuncture and finger prick were found to be highest for laboratory technicians ($\chi^2=19.6$, $df=3$, $p<0.01$). However, the use of additional barrier protection did not result in significantly different responses according to respondents' job title.

Disposal of Sharps: When asked to report their practices about proper handling and disposal of sharps, those that said they always complied with proper handling of used needles (not recapped or manipulated by hand) accounted for 61% ($n=74$). A higher proportion reported discarding needles and other sharp instruments in puncture-resistant containers 72% ($n=88$), (Table 2).

Comparison of respondents' compliance with disposal of sharps by their work setting is presented in Table 3. A high proportion of HCWs in surgery were found more compliant with proper handling of used needles than subjects in other settings. The difference was statistically significant ($\chi^2=19.53$, $df=3$, $p<0.01$). However, response rates were not influenced by respondents' job title ($p>0.01$, Table 4).

Resuscitation and Ventilation Devices: Although saliva has not been implicated in HIV transmission, respondents were asked whether they have used devices to avoid mouth to mouth contact during artificial ventilation. Among the total respondents only 13% ($n=16$) reported the use of a pocket mask, while 19% ($n=23$) of them reported placing the pocket mask or bag-valve-mask in areas where they were immediately accessible (Table 2).

A notably large proportion of responses for non-compliance with the use of resuscitation and ventilation devices was observed according to respondents' work setting and job title. However, there was no statistically significant difference in the rate of responses between work setting and job title ($p>0.01$, Tables 3&4).

Handling Linen, Surfaces, and Fluids Soiled with Blood: Subjects were asked about their compliance with placing and transportation of soiled linen in leakage resistant bags; use of chemicals to decontaminate work surfaces; and pouring of bulk blood, suctioned fluids, and excretions containing blood down drains connected to a sanitary sewer. As shown in Table 2, less than one-half of the subjects had followed any of these precautions. There was a significant statistical difference between work settings in reported frequency of compliance with placing and transporting linen soiled with blood or body fluids in leakage resistant bags ($p < 0.01$). The highest proportion of compliance observed was in the pediatrics ward (Table 3). Significant differences were also noted among the ranks of HCWs in reported compliance to the three procedures ($p < 0.01$). Among HCWs nursing personnel reported to have more frequently performed these procedures than other HCWs (Table 4).

At the end of the questionnaire, blank space was provided for participants to write comments on observed or experienced barriers to practice UP techniques in Jimma hospital. Comments made by more than one HCW starting with the most frequently written comments were: unavailability of needed supplies; items not readily available at the bedside; being pressured or hurried

and not in the habit of using precautions. Other comments: considering some patients as low risk for AIDS; cannot remember and provisions of neither special AIDS training nor precaution guidelines or directives by the hospital.

Table 1. Socio-demographic characteristics of the health workers participated in the survey, Jimma, Feb.- March 1999.

Variables	Frequency	
	(n=122)	%
Sex		
Male	76	62.3
Female	46	37.7
Work unit/Dept.		
Medical	19	15.6
Surgical	34	27.9
Obs/Gyn	30	24.6
Pediatrics	11	9.0
OPD & Lab.	28	22.9
Job Title		
Health Assistant	36	29.5
Nurse	38	31.1
Physician +Intern	36	29.5
Lab. Technician	12	9.8
Service (years)		
≤ 1	32	26.2
1-5	33	27.1
6-10	22	18.0
>10	35	28.7

Table 2. Frequency and percentage distribution of compliance and non-compliance responses with the specific UP techniques, Jimma, Feb. - March 1999.

UP Techniques	Compliance		Non-compliance	
	Freq.	%	Freq.	%
1. <i>Hand washing</i>				
- After skin contamination with blood containing substances	108	88.5	14	11.5
- Between patients	39	32.0	83	68.0
- After gloves are removed	95	77.9	27	22.1
2. <i>Barrier precautions</i>				
- Wearing gloves whenever there is a possibility of exposure	79	64.8	43	35.2
- Wearing gloves for performing veni-puncture & finger prick	43	35.2	79	64.8
- Using mask, eyewear, gowns during procedure likely to generate splashes of blood or body fluids	27	22.1	95	77.9
3. <i>Handling and disposal of sharps</i>				
- Proper handling of used needles (not recapped and manipulated by hand)	74	61.2	48	38.8
- Discarding used needle, scalpel, sharp items in puncture resistant container	88	72.1	34	27.9
4. <i>Resuscitation/ventilation devices</i>				
- Use of a pocket mask or bag valve mask for artificial ventilation	16	13.1	106	86.9
- Placing a pocket mask or bag valve mask in areas immediately accessible.	23	18.9	99	81.1
5. <i>Bagging linens, cleaning surfaces, disposal of fluids soiled with blood</i>				
- Bagging and transporting soiled linens in leakage resistant bags.	33	27.5	89	72.5
- Using a germicide or house hold bleach to decontaminate spills of blood or body fluids from work surfaces	42	34.4	80	65.6
- Pouring bulk blood, suctioned fluids, secretions & excretions containing blood down drains connected to sanitary sewer.	50	41.0	72	59.0

Table 3. Distribution of reported Compliance and Non-compliance with UP techniques with UP techniques by Respondents Work settings, Jimma, Feb. - March 1999.

VARIABLES (UP Techniques)	HEALTH CARE WORK SETTINGS												X ²	P-Value		
	C*		Medical		Surgical		Ob & Gyn		Pediatrics		OPD & lab					
	NC**	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%				
1. Hand Washing:																
- After contact	C	13	68.4	31	91.2	29	96.7	10	91.0	25	89.3					
	NC	6	31.6	3	8.8	1	3.3	1	9.0	3	10.7	9.83	0.0433			
-Between patients	C	3	15.8	12	35.3	4	13.3	2	18.2	18*	64.3					
	NC	16	84.2	22	64.7	26	86.7	9	81.8	10	35.7	21.66	0.0002			
-After gloves	C	10	52.6	27	79.4	25	83.3	8	72.7	25	89.3					
	NC	9	47.4	7	20.6	5	16.7	3	27.3	3	10.7	9.88	0.0425			
2. Barrier protection:																
- Wearing gloves (OB, surgery)	C	9	47.3	28*	82.3	23	76.6	4	36.3	15	53.5					
	NC	10	52.7	6	17.7	7	23.4	7	63.7	13	46.5	14.41	0.0060			
-Wearing gloves for (venipuncture, fingerprick)	C	3	15.7	13	38.2	5	16.6	4	36.3	18*	64.2					
	NC	16	84.3	21	61.8	25	83.4	7	63.7	10	35.8	18.17	0.0011			
-Wearing (mask, eyewear, gown) for OB, Surgery, etc.	C	2	10.5	11	32.3	12	40.0	1	9.1	2	7.1					
	NC	17	89.5	23	67.7	18	60.0	10	90.9	26	92.9	13.44	0.0093			
3. Proper handling of used needles	C	14	73.6	29*	85.2	21	70.0	2	18.1	22	78.5					
	NC	5	26.4	5	14.8	9	30.0	9	81.9	6	21.5	19.53	0.0006			
-Discarding used needle, scalpel, and other sharp items in puncture resistant container.	C	8	42.1	21	61.7	19	63.3	4	36.3	23.1	2.71	0.6066				
	NC	11	57.9	13	38.3	11	36.7	7	63.7	17.9						
4. Resuscitation & ventilation Devices																
-Use of a pocket mask / bagvalve-mask for artificial ventilation	C	1	5.2	5	14.7	5	16.6	1	9.1	6	21.4					
	NC	18	94.8	29	85.3	25	83.4	10	90.9	22	78.6	2.71	0.6066			
-Placing a pocket mask or bag valve mask in areas immediately accessible	C	2	10.5	6	17.6	6	20.0	1	9.1	10	85.7					
	NC	17	89.5	28	82.4	24	80.0	10	90.9	18	14.3	6.19	0.185			
5. Handling linens, surfaces, fluids																
-Bagging and transporting soiled linens in leakage resistant bags	C	3	15.7	6	17.6	15	50.0	6*	54.5	6	21.4					
	NC	16	84.3	28	82.4	15	50.0	5	45.5	22	78.6	14.27	0.0006			
-Using a chemical or bleach to decontaminate spills of blood or body fluids from work surfaces	C	3	15.7	16	47.0	15	50.0	2	18.1	9	32.1					
	NC	16	84.3	18	53.0	15	50.0	9	81.9	19	67.9	9.28	0.054			
-Pouring bulk blood, suctioned fluids, secretions and excretions containing blood down drains connected to sanitary sewer.	C	7	36.8	18	52.9	13	43.3	5	45.4	10	35.7					
	NC	12	63.2	16	47.1	17	56.7	6	54.6	18	64.3	2.28	0.683			

* C = Compliance; ** N-C = Non-compliance

Table 4. Distribution of Reported Compliance and Noncompliance Rates with UP Techniques by Respondents' Job Title, Jimma, Feb.- March 1999.

VARIABLES (UP Techniques)	C/ NC	respondents job title				X ²	P-Value
		Health Assistant	Nurse	Physicia n / Intern	Lab. Tec hnician		
		Freq (%)	Freq (%)	Freq (%)	Freq (%)		
Hand washing:	C	31 (86.1)	35 (92.1)	29 (80.6)	11 (91.7)		
- After contact	NC	5 (13.9)	3 (7.9)	7 (19.5)	1 (8.3)	2.57	0.463
-Between patients	C	12 (33.3)	12 (31.6)	4 (11.1)	11 (91.7)		
	NC	24 (66.7)	26 (68.4)	32 (88.9)	1 (8.3)	26.9	0.000006
- After gloves	C	32 (88.9)	33 (86.8)	18 (50.0)	11 (91.7)		
	NC	4 (11.1)	5 (13.2)	18 (50.0)	1 (8.3)	21.26	0.00009
BarrierPrecaution:							
Wearing gloves in exposure possibility	C	28 (77.8)	30 (78.9)	16 (44.4)	5 (41.7)		
	NC	8 (22.2)	8 (21.1)	20 (55.6)	7 (58.3)	15.34	0.0015
-Wearing gloves for Venipuncture, prick	C	14 (38.9)	14 (36.8)	5 (13.9)	10 (83.3)		
	NC	22 (61.1)	24 (63.2)	31 (86.1)	2 (16.7)	19.60	0.0002
-Wearing mask, eyewear, gown for possible splashes	C	10 (27.8)	11 (28.9)	6 (16.7)	1 (8.3)		
	NC	26 (72.2)	27 (71.1)	30 (83.3)	11 (91.7)	3.50	0.320
Handling & disposal of sharps							
-Handling of used needles (not recapped)	C	26 (72.2)	29 (76.3)	26 (72.2)	11 (91.7)		
	NC	10 (27.9)	9 (23.7)	10 (27.8)	1 (8.4)	2.12	0.54
-Discard used needles, scalpel, sharp items in resistant container	C	29 (80.6)	31 (81.6)	19 (52.8)	9 (75.0)		
	NC	7 (19.5)	7 (18.4)	17 (47.2)	3 (25.0)	9.72	0.0211
Resuscitation/Ventil.							
-Use of a pocket mask or bagvalve mask for artificial ventilation	C	8 (2.2)	6 (15.8)	4 (11.1)	1 (8.3)		
	NC	28 (7.8)	32 (84.2)	32 (88.9)	11 (91.7)	4.22	0.238
- Pacing valve mask in areas immediately accessible	C	14 (8.9)	6 (15.8)	5 (13.9)	1 (8.3)		
	NC	22 (1.1)	32 (84.2)	31 (86.1)	11 (91.7)	.53	0.022
Baging linens etc							
-Bagging & transporting soiled lines in leakage resistant bags.	C	13 (36.1)	18 (47.4)	4 (11.1)	1 (8.3)		
	NC	23 (63.9)	20 (52.6)	32 (88.9)	11 (91.6)	15.64	0.0013
-Using germicide/house hold leach to decontaminate spills of blood or body fluids	C	18 (50.0)	20 (52.6)	5 (13.9)	1 (8.3)		
	NC	18 (50.0)	18 (47.4)	31 (86.1)	11 (91.7)	19.83	0.0001
-Pouring bulk blood, suctioned fluids, secretions, excretions containing blood	C	21 (58.3)	23 (60.5)	8 (22.2)	1 (8.3)		
	NC	15 (41.7)	15 (39.5)	28 (77.8)	11 (91.7)	21.10	0.0001

DISCUSSION

Universal Precautions are applied to blood or body fluids containing traces of blood from all clients regardless of their diagnosis (1). UP protocols are methods intended to prevent parenteral, mucous membrane and

non-intact skin exposure of HCWs to blood-borne pathogens. Unfortunately, the cumulative findings from several studies indicate that HCWs often fail to follow guidelines.

HCWs are directed by the CDC to consider all clients as potentially infected with blood borne pathogens such as HIV and HBV. Since the beginning of the AIDS epidemic, numerous instances of HIV-1 transmission from patients to HCWs have been documented (16). The AIDS epidemic has heightened awareness of potential occupational risks, and methods to reduce blood borne infections have become more important.

The analysis of the demographic data provide only little insight on who is likely to be more compliant with UP, with the exception of work setting and job title. Age, sex and year of service in the hospital appear to have no influence on the rate of compliance with UP as measured by this study. Thus these findings are congruent with those of Gruber *et al.* (15) who found demographic variables indicated no influence on either knowledge of UP or compliance scores.

On evaluating reported compliance rates, the difference among work settings is so great, one could postulate that perhaps this reflects the influence of the leadership and variations in the degree of risk and other facilities between work settings in the hospital. Gruber *et al.* (15) and Miramontes (3) also noted differences between work settings in their research.

An examination of the reported frequency of compliance rates within the low or high compliant HCWs job title group suggests that some precautions were uniformly associated with low compliance. For example the lowest compliance in all job title groups was observed in the use of additional barriers and resuscitation.

There were also some significant differences between the job title groups. Nurses reported compliance with bagging articles; clearing surfaces and disposal of infected fluid waste was found to be significantly higher than the other groups. Together these findings suggest that there

is a cautious group of practitioners who experience difficulty with some major precautions but otherwise successfully protect themselves. Stotka *et al.* (12) also noted significant differences among different professional groups. Examination of the specific UP that yielded significant results indicate that, despite the magnitude of the AIDS epidemic and information in health related and professional literature, some HCWs resistance to comply with UP is problematic.

Although hand washing between patients is considered an important practice to prevent transmission of a number of diseases including HIV, the majority of respondents consistently reported non-compliance with this technique. This supports the findings of Albert & Candy (17) whose observational study of hand washing frequency by doctors and nurses occurred after only 41% of patient contacts. Other related findings involved an overall higher compliance with hand washing after skin exposure and removal of gloves. These findings are congruent with those of Williams & Buckles (18) who found reported frequency of hand washing was three times more than actual frequency.

Regarding compliance with the use of barrier techniques, the investigation suggests that work settings have not adequately responded to the CDC recommendations to adopt UP policies for barrier protection use by HCWs. Actual glove use by HCWs appears to be substantial but not universal. Although additional barrier use by HCWs is significantly related to work setting, the majority of respondents have reported noncompliance. The fact that the hospital provides neither special AIDS guidelines for employees nor adequate protective equipment needed to implement UP, such as gowns, gloves and goggles, may have influenced HCWs failure to comply in these aspects.

A significant amount of information is available on needle stick exposure sustained by HCWs due to non-compliance with proper handling of sharp instrument (19, 20). Despite available information, our survey findings indicate 39% (n=48) of the respondents failed to take adequate precautions to prevent needle-stick exposure. This supports the work of Becker (11) who found needle-recapping rates of 25-50%. Similar finding was also reported by Jackson *et al.* (21) in which carelessness and recapping needles were the primary causes of needle stick injuries among nursing and medical personnel.

Tests for comparing the differences in the rate of compliance with use of resuscitation/ventilation devices between the various work settings and HCWs established a non-significant but high proportion of non-compliant behavior. Analysis of compliance rates on bagging of articles, cleaning spills and disposal of contaminated fluid wastes demonstrates a significant proportion of non-compliance with these safety precautions. Together these findings suggest non-applicability of these tasks to some of the respondents. Several barriers to practice were identified. Unavailability of supplies was the most frequent reason noted for non-compliant behavior, i.e. goggles, gloves, masks, and sometimes soap and running water. Items not being readily available at the bedside such as gloves, gowns and masks were cited. Other glove related comment made by some of the respondents was that they do not wash their hands immediately after removing their gloves. Because the integrity of gloves as a barrier is imperfect (22-24), hand washing minimizes the acquisition and transmission of pathogens. Being pressured and hurried and habit were also among reasons mentioned for not carrying out some of the CDC recommendations. Absence of special

AIDS training, weak guidelines and lack of supervision from the hospital leadership were also cited as barriers to compliance by some respondents.

In conclusion, the findings from this study point to two general areas where intervention is needed. Changes are needed in the work place environment and staff education about HIV to include a greater focus on all aspects of UP protocols. Gloves and other protective material must be available for HCWs. Specific directives from hospital administration are essential to clarify what is expected of each HCW regarding the implementation of UP. This could be facilitated by the development of UP policy at national and local level. Poster displays could be used to remind HCWs of key UP techniques.

Education is crucial to the implementation of UP. It must be integrated into all health institution profession education and in service training for HCWs. A psychosocial approach may be essential to motivate the HCW to comply with universal precautions.

Further research is needed to determine the motivating factors that will influence the UP practice behaviors of HCWs.

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