

THE PREVALENCE OF, AND FACTORS RELATED TO, COMPLIANCE WITH GLOVE UTILIZATION AMONG NURSES IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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Abstract. Increasing risk of HIV infections among health care workers has been a continuing concern. The study was designed to identify the compliance of glove utilization, and factors related to non-compliance. A sample of 150 staff nurses were recruited from the study population of 550 nurses in Hospital Universiti Sains Malaysia. Data were collected by using a structured self-administered questionnaires. The response rate was 98.4%. The study revealed a low compliance (13.5%) of glove utilization (for all 9 procedures), which varied among different procedures (27-97%). Younger nurses and those with shorter duration of working experience had better knowledge of Universal Precautions. Nurses in intensive care unit and operation theatre were better in both knowledge and compliance of glove utilization. The three commonest misconceptions were identified as "selective use of gloves for high risk groups and suspected cases", and "tendency to depend on HIV prevalence". Nurses reported practical problems including administrative and personal related such as "stock irregularity" (46%), "glove not available at the emergency sites" (44%), and "reduction of tactile sensation" (39%). It was concluded that poor knowledge and practical problems were possible responsible factors for the low compliance. A good training for nurses comprising principle and practice of Universal Precautions, updated knowledge of blood and body fluid borne infections and risk and its management, will probably improve the compliance.

INTRODUCTION

With the increasing prevalence of human immunodeficiency virus (HIV) infection and AIDS all over the world, the increasing risk of health care workers being exposed to blood and body fluid infected with HIV infection has been a continuing concern (Adegboye and Emeka, 1997). It has been recommended that one of the most efficient ways to control the transmission of these life-threatening infections was to practice "Universal Precautions" (UP) (Harfst, 1971).

The World Health Organization (1995) stated that the risk of transmitting HIV and other blood and body fluid borne diseases depends on health personnel practices, the prevalence and transmissibility of the blood-borne organism, and the amount or frequency of exposure.

UP was first recommended by the Centers for Disease Control (CDC) in 1987 (CDC,

1987) for the prevention of HIV transmission in health-care setting, which was updated a year later (CDC, 1988). The World Health Organization (1995) published a guide to prevent HIV transmission in health facilities. All documents uniformly state that the basic principle of the UP is to assume that all blood and body fluids as potentially infectious, regardless of whether they originate from a patient or health care worker, their blood borne infection status and their known HIV antibody status. Therefore, precautions should be applied in the care of all patients.

Gloves will be applied in bleeding control with minimal or spurting blood, emergency childbirth, blood drawing, starting an IV line, endotracheal intubation, oral/nasal suction and manually cleaning the airway, handling and cleaning instruments, vaginal examination, handling laboratory specimen, and all surgical procedures including oral surgery. Gloves should be discarded after each patient. Hand washing

after taking off the gloves is recommended.

Studies (Adegboye and Emeka, 1997; Kelen *et al.*, 1990; Bermingham and Kippax, 1998; Knight and Bodsworth, 1998; Saghafi *et al.*, 1992; Ahmad *et al.*, 1998; Kaczmarek *et al.*, 1991; Ben-David and Gaitini, 1997; Pichean-sathian, 1995; Nelsing *et al.*, 1997) found that the compliance for both UP and glove utilization were poor, and researchers expressed great concern on the improvement of the compliance with these precautions.

This study was conducted in Hospital Universiti Sains Malaysia (HUSM), a teaching hospital with 560 beds and various specialities and subspecialties.

METHODOLOGY

It was a cross-sectional study and a total of 150 staff nurses were recruited from 550 nurses available in HUSM by stratified random sampling with proportional allocation by departments. A set of structured self-administered questionnaire was distributed and 98.7% returned the questionnaires. It was designed to reveal the knowledge, misperceptions and compliance in various procedures and problems in gloves utilization. These were factual questions except for misperceptions, which was constructed based on reported misconceptions in literature (Adegboye and Emeka, 1997; Kelen *et al.*, 1990; Bermingham and Kippax, 1998; Knight and Bodsworth, 1998; Saghafi *et al.*, 1992; Ahmad *et al.*, 1998; Kaczmarek *et al.*, 1991; Ben-David and Gaitini, 1997; Pichean-sathian, 1995; Nelsing *et al.*, 1997).

The questionnaire was tested among 15 staff nurses, followed by interviewing the respondents as an alternative method. Minor changes in questionnaires were made after the test.

Statistical analysis: Frequency and percentage were calculated for categorical data such as ethnic, origin, college studied, current department, knowledge of UP, and compliance on each procedure. Mean, median and standard deviation were calculated for numerical data

such as age and work experience as a staff nurse. Relationship between personal variables versus knowledge of UP principle and glove utilization compliance (compliance in 5 procedures versus 6 and above) and the knowledge versus the compliance were analyzed by chi-squared test for independence. Data analysis was done by using Epi Info version 6.03 (Dean *et al.*, 1995).

RESULT

Sample

The mean age of the sample was 32.7 years and the standard deviation of 7.2, with the range of 21-50. About 80% were below 40 years of age. All participants were female nurses. The majority (96.6%) was Malays and the rest Chinese. About 70% were from Kelantan and the rest from neighboring states such as Terengganu (7%), Kedah (4%), and Perak (4%).

The distribution of various departments is shown in Table 1. The mean duration of working as a staff nurse was 8.8 years and the standard deviation of 6. Almost half of them worked in the current department for less than 5 years, 86% of which had never worked in other departments before and the rest worked in other departments but only a short duration of less than 2 years. Sixty-two percents of the participants graduated from College in Kelantan, 16% from Penang, 14% from Kuala Lumpur, and the rest from Perak, Terengganu, and Melaka.

Table 1
Department currently working.

Department	Number	Percent
Surgical (Surg) ward	30	20.3
Pediatric (Ped) ward	28	18.9
Obstetric and Gynecology (O and G) ward	27	18.2
Medical (Med) ward	17	11.5
Operation theatre (OT)	18	12.2
Intensive care unit (ICU)	10	6.8
Out-patient clinics (Clinics)	10	6.8
Accident and emergency (A and E)	8	5.4
Total	148	100

Table 2
Compliance with glove utilization for specific procedures.

Procedure / Activity	Number	%	95% CI ^a
Washing hands after taking off gloves	143	96.6	94 - 100
Oral / nasal suction	120	81.1	75 - 87
Changing gloves between patients	109	73.6	67 - 81
Handling and cleansing used instruments	101	68.2	61 - 76
Manually cleaning airway	98	66.2	59 - 74
Bleeding control with minimal bleeding	92	62.2	54 - 70
Emergency child birth	86	58.1	50 - 66
Blood drawing (venous blood)	40	27.0	20 - 34
Blood drawing (arterial blood)	40	27.0	20 - 34
Full compliance with all procedures	20	13.5	8 - 19

^a95% Confidence interval for proportion (%) of the full compliance.

Table 3
Opinion on misperceived statements.

Statement	Number	disagree	%
Wear gloves for only high risk groups	75		50.7
Wear gloves for only suspected patients	83		56.1
Wear gloves depending on HIV prevalence	85		57.4
If careful in IV line setting procedure, can be done without gloves	92		62.2
Waste money by using gloves with all patients	94		63.5
Not necessary to assume all patients are potentially infectious	105		70.9
In emergency, may not need to use gloves	126		85.1

Knowledge of UP

The study showed that 91% of respondents knew about the UP. The majority (90.5%) reported that they learnt UP from nursing training, 38% from a course/ training after being a staff nurse, and 31% from newspaper or journals. However, only 55.4% could select the correct principle of the UP.

Knowledge about blood and body fluids

The majority (91%) of respondents correctly answered that blood, semen, vaginal secretion, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, amniotic fluid and vomitus with blood were infectious for blood and body fluid borne diseases (*eg* HIV infection).

Compliance with glove utilization

Only 20 (13.5%) respondents reported full

compliance, using gloves always, for all 9 procedures. Among the 9 procedures, the compliance rates varied from 27% to 97% (Table 2).

Misperception on UP principles and practices

Only 51-57% clearly rejected the misperception such as using gloves only for high-risk groups, for suspected patients, and depending on HIV prevalence (Table 3). Sixteen (11%) respondents rejected all misperceptions.

Problems in using gloves

Ninety-seven percents of respondents reported at least one problem in using gloves. The three most common problems were "sometimes, gloves are out-of-stock" (46%), "not available at emergency site" (44%), and "reduction of tactile sensation" (39%) (Table 4).

Table 4
Practical problems in glove utilization.

Practical problem	No.	%
Sometimes, gloves are out of stock	68	45.9
Gloves are not available at the emergency site	65	43.9
Gloves reduce my tactile sensation	57	38.5
Gloves do not fit my hands	18	12.2
My hands' activities become slow	15	10.1
I am allergic to the glove's rubber	13	8.8
My hands get numbed due to gloves	7	4.7
At least one of the above	144	97.0

Table 5
Relationship between knowledge of UP principle and personal variables.

Variables	Levels	Incorrect ^a (%)	Correct ^b (%)	Total	Result
Age groups	< 30	20 (34.5)	38 (65.5)	58	$\chi^2=11.806$ df=2, p=0.003
	30-39	25 (41.0)	36 (59.0)	61	
	40 and above	21 (72.4)	8 (27.6)	29	
Years as staff nurse	< 8 yrs	27 (36.5)	47 (63.5)	74	$\chi^2=3.938$ df=1, p=0.047
	8 and above	39 (52.7)	35 (47.3)	74	
Current department	A and E/Clinics	11 (61.1)	7 (38.9)	18	$\chi^2=17.308$ df=5, p=0.004
	ICU/OT	6 (21.4)	22 (78.6)	28	
	Med ward	8 (47.1)	9 (52.9)	17	
	O and G ward	16 (59.3)	11 (40.7)	27	
	Ped ward	17 (60.7)	11 (39.3)	28	
	Surg ward	8 (26.7)	22 (73.3)	30	
Total		66 (44.6)	82 (55.4)	148	

^aIncorrect UP principle; ^bCorrect UP principle

Relationship between personal variables and knowledge of UP principles, and compliance with glove use

Age group, years as staff nurse, and current department were significantly related to knowledge of UP principle (Table 5), whereas only current department was significantly related to compliance (Table 5 and 6). Nurses in the younger age group, and with less working experience, had better knowledge of UP. Nurses in intensive care unit and operation theatre were better in both knowledge and compliance of UP.

Relationship between knowledge of UP principle and compliance of glove use

Knowledge of UP principles and the com-

pliance of glove use had a significant relationship ($\chi^2 = 5.049$, df=1, p=0.025). About 61% of those who knew the principles of UP complied with glove use in six and more procedures compared to 42% of those who did not know UP.

DISCUSSION

In this study, the overall compliance rate of glove utilization for all procedures was low (13.5%). We tried to compare with international data but most of them had different methodology. In the US, the compliance rates of UP varied widely among health care providers between 8 to 91% (Kelen *et al*, 1990). In studies specifically on glove utilization, 42%

Table 6
Relationship between compliance and personal variables.

Variables	Levels	L.Comply ^a (%)	H.Comply ^b (%)	Total	Result
Current department	A and E/Clinics	3 (16.7)	15 (83.3)	18	$\chi^2=29.738$ df=5, p=0.000
	ICU/OT	8 (28.6)	20 (71.4)	28	
	Med ward	7 (41.2)	10 (58.8)	17	
	O and G ward	16 (59.3)	11 (40.7)	27	
	Ped ward	24 (85.7)	4 (14.3)	28	
Total	Surg ward	12 (40.0)	18 (60.0)	30	
		70 (47.3)	78 (52.7)	148	

^aCompliance with UP for < 6 procedures; ^bCompliance with UP for 6 and > procedures.

of Australian GPs (Bermingham and Kippax, 1998), 42% of Australian nurses (Knight and Bodsworth, 1998), 35% of Nigerian health workers (Adegboye and Emeka, 1997), and 46% of Swiss nurses (Saghafi *et al*, 1992), did not comply with glove utilization.

The study supported the previous findings (Ahmad *et al*, 1998; Kaczmarek *et al*, 1991) that the compliance of glove utilization or overall UP varied with different procedures. These studies also reported that the compliance varied among different health care providers.

This study revealed that the younger age group had better knowledge of UP principle. One possible reason is that the UP was recommended from 1987 and therefore, not accessible to the senior nurses. Although the relationship between knowledge of UP and the compliance was established, the study failed to prove that better compliance related to the younger age group as reported by Ben-David and Gaitini (1997). This indicates that further research questions are required to explore more detail knowledge and factors influencing the compliance.

Apparently, the knowledge and compliance to glove utilization were different among various departments. Although possible factors could be suggested such as different activities, nature of work, and administration in different departments, it is not worthwhile to make any conclusion because the sizes of some departments are too small. Further analytical studies

comparing departments and controlling possible confounders are indicated.

The common misperception reported were related to selective use of gloves in high-risk groups and high-prevalence HIV infection. This supported Bermingham's finding (Bermingham and Kippax, 1998) that 42% of general practitioners selectively used gloves especially for homosexuals. Similarly, a multi-state, multi-constitutional investigation (Kaczmarek *et al*, 1991) in the US reported that compliance rate was significantly lower in the states with a prevalence of AIDS below the national average than in the states with a higher AIDS prevalence. In some studies (Adegboye and Emeka, 1997; Picheansathian, 1995), it was reported that "believing UP as not necessary" and "poor compliance due to emergency nature of the procedure" were common misperceptions whereas these two were uncommon in our study.

Common reasons for non-compliance with glove use was related to administration such as "out of stock sometimes", "gloves not available at emergency sites" and "unfit gloves". Others were reduction of physical activity of hands and allergy to glove rubber. Similar findings were reported by Nelsing *et al* (1997) and Picheansathian (1995).

The prevalence of reported glove allergy was 9% in this study. Others (Knight and Bodsworth, 1998; Amin *et al*, 1996) reported 5% to 24.1%. It was a considerable size of population and non-latex glove should be

available for them.

Although UP was officially recommended since 1987, till today, studies revealed poor compliance. Therefore, effective interventions should be developed with great concern to improve compliance.

CONCLUSION

Low compliance related to poor knowledge and possible practical problems in using gloves. Therefore, the administrative control could play a key role in the improvement of UP compliance, especially glove utilization.

RECOMMENDATIONS

It is very helpful for a health facility to adopt WHO guide "Universal Precautions: Planning, Policy and Practice" (Global programme on AIDS, 1995). It indicates details of the responsibility for UP, risk assessment and risk reduction strategies, setting policy and priorities, staff training, developing guidelines, obtaining supplies, and finally monitoring the compliance and quality assurance.

Staff training should include information on blood and body fluid borne diseases, and the basic principles and practice of UP. In addition, the basic principle of risk and its management should be included.

Similar studies on newly graduated nurses, other health care workers, and more specific analytical studies to reveal causes of non-compliance are recommended. Development of interventions to improve compliance and the study on their effectiveness will be beneficial.

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