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#### Correspondence

Ms. Indra Shrestha (Rai)  
College of Nursing, Nepalese  
Army Institute of Health Sciences,  
Kathmandu, Nepal  
Email: gopal@pacenepal.com

#### Peer Reviewed by:

Dr. Sumana Bajracharya  
Patan Academy of Health  
Sciences  
Email: suamanabajracharya@pahs.  
edu.np

Dr. Jay N Shah  
Patan Academy of Health Sciences  
Email: drjaywufei@gmail.com

# Impact of Educational Intervention on Knowledge and Practice of Universal Precautions among Nurses

Ms. Indra Shrestha(Rai)

College of Nursing, Nepalese Army Institute of Health Sciences, Kathmandu, Nepal

## ABSTRACT

**Introductions:** The purpose of this study was to find out the effectiveness of educational intervention in improving knowledge and practice of universal precautions among nurses.

**Methods:** This was a cross sectional observational study conducted at Patan Hospital in August 2008. Fifty nurses with minimum one year of experience were included. Twelve, out of 50 samples were selected by drawing lot for the study of practice of universal precautions. A semi-structured questionnaire was used to measure the knowledge and practice of universal precautions.

**Results:** The findings revealed that there was significant difference in the pre and post-intervention test mean knowledge. The grand mean score of knowledge and practice of universal precautions as a whole were 31.86 and 44.55 with standard deviations of 10.46 and 3.90; and 68.61 and 87.70 with standard deviations of 3.70 and 2.55 in the pre and post intervention tests respectively.

**Conclusions:** Educational intervention had significant role in increasing knowledge and practice of universal precautions among nurses.

**Keywords:** blood-borne infections, body fluids, knowledge and practice, needle stick injury, universal precautions

### Plain Language Summary

The effectiveness of educational intervention in improving knowledge and practice of universal precautions among nurses was studied. The face to face educational intervention had significant role in increasing the knowledge and practice of universal precautions.

## INTRODUCTIONS

Health care providers nurses, doctors, laboratory technicians are at risk of acquiring blood-borne infections through occupational exposure to sharp and needle-stick injuries. Young nurses with less professional experience are more prone to such injuries. Nurses less than 24 years of age had 92.2% risk of needle-stick injuries, 13 times higher than 40 years and above.<sup>1</sup>

The Center for Disease Control and Prevention (CDC) of USA introduced the concept of universal precautions (UP) as guidelines for protecting healthcare workers from becoming infected with blood borne infection.<sup>2</sup>

The number of sharps and needle-stick injuries per person among healthcare workers continues to be a challenge globally.<sup>3</sup>

The purpose of this study was to find out the effectiveness of educational intervention in improving nurses' knowledge and practice of UP.

## METHODS

This was a cross sectional observational study conducted in Patan Hospital, Patan Academy of Health Sciences, Nepal, in August 2008. The population of this study consisted of nurses working in medical, surgical, orthopedic, maternity, gynecology, intensive care unit and neonatal nursery of Patan Hospital. Non-probability convenience sampling technique was used. A total of 50 nurses were included to test the knowledge of UP before and after educational intervention. The nurses with minimum of one year of experience, with Proficiency Certificate Level education in nursing, willing to participate in the study were included. An educational intervention package was developed which included definition, purpose, components of UP, sources of infection, and factors contributing to enforcement of UP. A semi-structured questionnaire consisting of questions related to demographic characteristics and knowledge regarding UP was developed. The content validity was established by developing the instruments on the basis of literature review in consultation with research committee chairperson, research guide and subject expert. The reliability of the instruments was established by pre-testing it on five (10%) nurses working in Tribhuvan University Teaching Hospital.

Out of 50 nurses, 12 were selected by drawing lot to observe the practice of UP which included hand washing technique, use of gloves, and proper disposal of needles after use. The rating scale (1 to 3 score) was used to determine the level of practice of UP. The stepwise

practice of hand washing technique included removing watch and jewelry, soap application, rinsing hands from fingertips upwards and drying with clean towel.

The data were collected by self-administered questionnaire before the educational intervention followed by educational intervention on the same day. Two weeks later, the post-intervention test was conducted by administering the same tool to the same participants.

Permission for study was obtained from the hospital authority. Verbal informed consent was obtained from participants. They were ensured about anonymity, confidentiality and refusal to participate or withdraw from the study if they wished so. The schedule for data collection and educational intervention were planned according to suitable time given by the hospital administration, and was done in three sessions.

Completeness and consistency of questionnaire was checked. SPSS version 11.5 was used for analysis. Frequency, percentage, mean, and standard deviation were calculated. Chi-square, 'z'-test and 't'-test were used for pre and post-intervention analysis of knowledge and practices of UP. 'p'-value <0.05 was considered significant.

## RESULTS

All 50 nurses were female with mean age of 25.7 years (range 21 to 42) and 31 were below 25 years of age. In terms of years of working experiences, 40 had 1 to 5 years of experience (26 had 1 to 3 years), seven had 5-10 years and three above 10 years. Only 15 respondents had orientation class on UP and none had received in-service training.

The knowledge score regarding body fluids: semen, vaginal and amniotic, cerebrospinal and breast milk as a source of infection were 42, 18, 12 in the pre-intervention test; and 46, 43, 41 in the post-intervention test respectively. The difference between pre and post-intervention test knowledge about cerebrospinal fluid and breast milk were significant ( $p=0.000$ ); whereas semen, vaginal and amniotic fluids were not significant ( $p=0.218$ ).

The knowledge regarding decontamination, high-level disinfection (HDL) and sterilization revealed that the correct responses ranged from seven to 25 in the pre-intervention test and 26 to 44 in the post-intervention test. The difference between the pre and post-intervention level of knowledge score were statistically significant with score of 14.22% and 34.77%.

**Table 1. Pre and post-intervention knowledge about UP among nurses (n=50)**

Components	Pre-test		Post-test		χ <sup>2</sup> p Value
	No.	%	No.	%	
Hand washing:					
Before & after performing any procedure	48	96.00	50	100.00	0.315
After removing gloves	30	60.00	42	84.00	0.008
After handling contaminated items	38	76.00	48	96.00	0.004
Splashes of Blood/body fluids:					
Wash face with soap & water immediately	49	98.00	50	100.00	0
Needle-stick injury:					
* Not necessary to report	38	76.00	48	96.00	0.007
Mean Score	40.66		47.66		0.003**
Standard Deviation	7.33		3.33		

UP= universal precaution, \*Negative response, \*\*Z test

There was least difference in the knowledge score where the respondents had previous knowledge like management of blood and body fluids exposures, disposal of wastes. The difference between pre and post-intervention level were statistically significant for those questions where the respondents did not have previous knowledge.

The individual knowledge score in pre-intervention among 50 respondents was of low level (<50.0%) in nine and moderate (50.0% to 75.0%) in 41 and post intervention it was moderate level (50.0% to 75.0%) in 18 and high (>75.0%) in 33.

**Table 2. Pre and post- intervention knowledge of UP among nurse (n=50)**

Knowledge Items	Mean Score (%), ± SD				χ <sup>2</sup> p Value
	Pre-test		Post-test		
	MS	SD	MS	SD	
General information	35.22	17.66	48.00	3.44	0.000
Sources of infection	24.00	15.88	43.33	2.55	0.000
Utilization of PPE in UP	45.22	3.66	49.00	1.22	0.164
Safe work practices in UP	40.66	7.33	47.66	3.33	0.003
Decontamination, High-Level-Disinfection and sterilization	14.22	7.77	34.77	9.00	0.000
Grand Mean Score (MS)	31.86		44.55		0.033**
Grand Standard Deviation (SD)	10.46		3.90		

PPE= Personal Protective Equipment

There was significant difference in the pre and post-intervention mean score of practice of universal precautions. The individual practice score revealed that 12 had moderate level (60.0% to 80.0%) of practice in the pre-test and 12 had high level (>80.0%) of practice in the post-test respectively.

After educational intervention the practice of UP improved for handling of needles, washing hands and use of gloves, Table 3 and 4.

The stepwise practice of hand washing technique score ranged from 52.88 (rinsing hands from finger tips towards) to 83.33 (drying hands with clean, dry towel) in pre-intervention practice and 72.22 (removing watch and jewelry) to 94.44 (soap application; drying hands) in post-intervention practice. The difference were significant with p=0.000.

The score on practice of use of gloves ranged from 44.44 to 100.00 in the pre-intervention and 80.55 to 100.00 in the post-intervention. The difference were significant with p=0.000.

**Table 3. Pre and post-intervention practice of UP- handling of needles after use among nurses (n=12)**

Procedural steps	Mean Score MS ( (%), ± (SD)				P value for 't' test
	Pre-test		Post-test		
	MS	SD	MS	SD	
1. Does not recap, bend, break or manipulate needles after use.	100.00	0.00	100.00	0.00	0.000
2. Carries syringe & needle in a small tray.	100.00	0.00	100.00	0.00	0.000
3. Disposes in puncture resistant container.	63.80	0.77	100.00	0.00	0.000
4. If reusing syringes, soaks in 0.5% chlorine solution for 10 minutes.	47.22	0.50	66.70	0.66	0.162
5. Rinses the syringe in clean water.	41.66	0.44	72.22	0.60	0.057
Mean Score	70.53		87.78		0.000
Standard Deviation	0.34		0.25		

**Table 4. Pre and post-intervention practice of UP among nurses (n=12)**

Observation	Mean Score (%), ± S.D.				P value for 't' test
	Pre-test		Post-test		
	MS	SD	MS	SD	
Hand Washing	62.06	6.33	83.34	5.31	0.000
Use of Gloves	73.26	4.45	92.00	2.09	0.000
Handling of Needle	70.53	0.34	87.78	0.25	0.000
Grand Mean	68.61		87.70		0.000
Grand SD	3.70		2.55		

**DISCUSSIONS**

Most of the nurses were in early stage of career with less than five years experience, 40 within 1 to 5 years (26 within 1 to 3 years). According to Mustafa young nurses with less professional experience, working in surgical and intensive care unit were accepted as risk group and targeted for training program.<sup>4</sup>

We found that there was least difference in the pre and post-intervention scores in terms of knowledge about the utilization of gloves, mask, goggles and gown but in practice did not translate in to compliance to use gloves when starting intravenous (IV) drip and drawing blood. The reason for not using the gloves was practical difficulty on palpating the veins and securing of cannula with tape which tends to stick to the gloves and interfere with dexterity.

Even though the hospital had written policy for post-exposure prophylaxis, and respondents had good knowledge about the situations of splashes of blood/body fluids and needle-stick injuries but lacked to report such injuries in time. This probably requires more awareness training and reporting. HLD was not practiced, so that may be the reason that there were significant changes in the knowledge in the post-intervention as the respondents did not have a good knowledge before the educational intervention.

There was lack of compliance to remove watches, bangles, finger rings which interfered with the hand washing technique. Trick also found out that the adherence to hand washing and proper washing technique by healthcare workers were uncommon. Creedon stated that the hospital acquired infections are serious problem, pathogens are readily transmitted to health workers hands and hand washing substantially reduces transmission.<sup>5,6</sup>

The good practice of handling needles after use might be due to good knowledge and hospital providing resources like puncture resistant container at convenient places like in the working area and dirty utility room, availability of IV trolley, and trays to carry syringe.

This study shows face to face educational intervention had significant role in increasing the knowledge and practice of UP like other studies<sup>7-10</sup> and should be included in comprehensive in-service educational program for nurses and possibly other healthcare workers.

The study had small sample size from a single hospital and convenience sampling which may affect adequate representation of the knowledge of nurses regarding practice of universal precaution.

## CONCLUSIONS

Educational intervention had significant role in increasing the level of knowledge and practice of universal precaution among nurses.

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