

# Knowledge and Compliance Regarding Standard Precautions among Nursing Students at Universiti Sains Malaysia

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## ABSTRACT

**Background:** Standard precautions (SP) are important in protecting both patients and healthcare professionals from occupational exposure as well as ensure patient safety. This study aimed to compare the knowledge and compliance regarding SP among diploma and degree nursing students at Universiti Sains Malaysia (USM). **Methods:** A cross-sectional study has been conducted among 134 nursing students using self-administered questionnaires. Respondents were recruited using a simple random sampling method. The data were analyzed by SPSS version 24 using descriptive and Spearman's Rank-Order test. **Results:** The study showed that diploma and degree nursing students had good knowledge regarding SP (mean of  $14.7 \pm 2.5$  and  $15.4 \pm 2.4$ ) and a high compliance level of SP (mean of  $3.6 \pm 0.3$  and  $3.7 \pm 0.2$  respectively). Washes hand immediately after contacting any blood, body fluid, secretion, excretion, and dirty substances has the highest degree of compliance among diploma nursing students, while washes hands when comes in different contact with different patients has the highest degree of compliance among bachelor degree nursing. Wear protective eye patch or google when performing operations/procedures that might induce spraying of blood, body fluids, secretions, and excretions was the lowest degree of compliance among both bachelor degree and diploma nursing students. There was no significant correlation between the level of knowledge and compliance with SP ( $p = 0.23$ ) but there is a significant correlation between the duration of practical training and compliance with SP ( $p = 0.02$ ). **Conclusion:** Nursing students in USM had good knowledge and high compliance regarding SP. Knowledge did not influence compliance with SP but duration of practical training session did influence compliance with SP.

**Keywords:** Standard precautions, knowledge, compliance, student nurses

## INTRODUCTION

Universal precautions is the term used for the guidelines that were developed by the Centers for Disease Control and Prevention in the 1980s to reduce the spread of infection to health care providers and patients in health care settings (1,2). Standard precautions (SP) is a new term that used for an expansion of universal precautions, recognizing that anybody fluid may hold contagious germ. SP protocol was designed to prevent the spread of blood-borne disease but are also excellent measures to prevent the spread of infectious disease in group care settings (1).

Universal precautions involve the use of protective barriers such as gloves, gowns, aprons, masks of protective barriers which can reduce the risk of exposure of health care workers to potentially infected materials (2).

Standard precautions are aimed at protecting both patients and healthcare professionals. The use of SP is recommended for delivering care to all patients, independently of their presumed infection state, when handling equipment and devices that are contaminated or suspected of contaminations, in a situation of contact with blood, body fluids, secretions, and excretions except for sweat (3). SP measures are hand hygiene, use of personal protective equipment such as gloves, apron, masks, gown and protective goggles; needle safety, and safe handling of potentially contaminated equipment or surfaces in the patient environment including respiratory hygiene and disposal of sharps, body fluids, and other clinical wastes properly (4).

Knowledge and compliance with SP are important to prevent hospital-associated infections and

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protect patients as well as medical workers from exposure to infectious agents. Knowledge of SP by health care workers may be influenced by their place of training and occupation status which can relate to type of training they received (4). Advance or basic training of the health care personnel did influence their knowledge and compliance with SP (6). Nurses need to protect themselves, the patients, and relatives from any form of hospital-acquired infections hence the need to practice SP (7). Besides, nursing students on the other hand are also more vulnerable to any form of hospital-acquired infections during training skills and acquisitions (8). Nursing students are often exposed to various infections during their clinical education or training and they have a responsibility to protect themselves (9). According to Attala et al (9), nursing students should be able to do the caring of patients after learning the principles of SP. Effective training is essential to ensure the concepts about SP are understood and put into practice wherever health care is provided.

Compliance on the part of healthcare workers with standard precautions has been recognized as an efficient and effective means to prevent and control healthcare-associated infections in patients and health workers (10). It is the fact that compliance with the SP prevents infections and protects health care workers during the provision of care, however, compliance is still not a common practice and thus poses a challenge. Lack of knowledge is the major reason for non-adherence to standard and isolation precautions (11). Other factors that contribute to low compliance in general health care workers include lack of time, lack of awareness, deficient lifelong learning process, sheer carelessness or guts to engage in risky behavior, inadequate equipment, and protective equipment (12,13). Thus this study was conducted to compare the knowledge and level of compliance towards SP between degree and diploma nursing students in Universiti Sains Malaysia.

## MATERIAL AND METHOD

A cross-sectional study has been conducted on nursing students, School of Health Sciences USM from December 2018 until January 2019. The nursing students involved in this study were from the 2<sup>nd</sup> year, 3<sup>rd</sup> year, and 4<sup>th</sup> year of their study program. The respondents are already learned about the SP during their first year and had done their clinical posting since the first year of the second semester.

The Raosoft sample calculation software was used to calculate the sample size and with consideration of a 10% dropout, 134 nursing students need for

this study. Nursing students in their first year of the study programme and students who are already have working experiences as a registered nurse were excluded from this study. Respondents were selected by simple random sampling using the lottery method according to the programme of study.

A set of self-administered questionnaires was used in the study consists of three parts. Part 1 was on socio-demographic data that identify the student nurses' sex, race, religion, ages, level of education, and duration of the practical session. Part 2 consists of 19 items asking respondents' knowledge regarding SP. The respondents need to answer the questions by choose Yes or No. The respondents scored 1 marks for correct answers and 0 for the wrong answer. The cumulative score for knowledge would range from zero to 19. The total score of knowledge was categorized as very good knowledge (16-19 points), good knowledge (12-15 points), fair knowledge (8-11 points) and poor knowledge (0-7 points). Part 3 consists of 17 items related to compliance with SP that were adopted from Labrague et al (10). The measurement of compliance used a Likert scale of 0=never, 1=seldom, 2=sometimes, 3=usually, and 4=always. The cumulative score for compliance would range from zero to 68. In determining the level of compliance, the following scaling was used; for high compliance = 3.51 – 4.00, average compliance = 2.51 – 3.50 and low compliance = 0 – 2.50. The higher the mean score, the better that person carries out the standard precautions. Cronbach's Alpha for the questionnaire was 0.83 for knowledge and 0.89 for compliance with SP. All data were entered and analysed using SPSS version 24. All numerical value was presented in mean and standard deviation (SD) and for categorical variables, frequency and percentage were used. To assess the difference in compliance practice, an independent t-test was used, with the level of significance was set at  $p < 0.05$ . Spearman's rank correlation was used to examine the association between knowledge and practice.

The study protocol was approved by the Research Ethics Committee (Human) JEPeM of Universiti Sains Malaysia, Kubang Kerian (USM/JEPeM/18110627). Written informed consent was obtained from the respondent before data collection. All participants and their backgrounds were kept anonymous and confidential.

## Data/Results

### Sociodemographic data

The mean age of 134 respondents was 21 years old, with an age range from 20 years to 26 years old. Females accounted for 87.3% of the respondents, while the other 12.7% were males. The majority of respondents are Malay (85.8%), followed by Chinese (11.9%) and Indian (2.2%). About 44% of the respondents were in the diploma programme and 56% were in the degree programme. The longest duration of practical training sessions recorded was 42 weeks, while the shortest duration of practical training sessions was 6 weeks with a mean of 24 weeks.

### Level of knowledge regarding standard precautions

Overall, the mean score of knowledge regarding SP among degree nursing students was high ( $15.4 \pm 2.4$ ) compared to diploma nursing students ( $14.7 \pm 2.5$ ). Among degree nursing students, a total of 43 (57.3%) respondents were very good on knowledge regarding SP, and 7 (9.3%) respondents in the category of fair and poor knowledge. Out of 59 diploma nursing students, a total of 33 (55.9%) respondents were very good on knowledge of SP, whereas only 10 (16.9%) respondents in the category of fair knowledge as shown in Table 2.

It is not much different in each item of knowledge regarding SP for both groups. Table 3 shows the three highest and three lowest percentages of the correct answer for questions related to knowledge of SP among nursing students.

### The compliance level on standard precautions among nursing students

The mean score of compliance regarding SP for degree nursing students and diploma nursing student were almost the same ( $3.7 \pm 0.3$  and  $3.6 \pm 0.6$  respectively). In terms of the level of compliance, 89.8% of diploma nursing students were in the category of high compliance as compared to degree nursing students (85.3%) (Table 2).

The highest scores of compliance level to SP among diploma nursing students are 'washes hand immediately after contacting any blood, body fluid, secretion, excretion, and dirty substances'. The lowest score of compliance level to SP is 'wear a protective eye patch or google when performing operations/procedures that might induce spraying of blood, body fluids, secretions and excretions' (Table 4).

The highest score of compliance level to SP among degree nursing students is 'washes hands when

comes in different contact with different patients'. The lowest score of compliance level to SP among degree nursing student is 'wear a protective eye patch or google when performing operations/procedures that might induce spraying of blood, body fluids, secretions and excretions' (Table 4).

### Correlation between knowledge, duration of practical training, and compliance on standard precautions among nursing students.

There was no significant correlation between knowledge and compliance with SP among nursing students ( $p = 0.23$ ). In terms of duration of practical training, there was a significant linear correlation with compliance with standard precautions among nursing students ( $p = 0.01$ ). However, there was a low negative correlation between those two variables.

**Table 1** Sociodemographic Data of the Respondents (n=134)

Variables	n (%)
<b>Gender</b>	
Male	17 (12.7)
Female	117 (87.3)
<b>Age (years) - Mean <math>\pm</math> SD</b>	21.0 $\pm$ 2.9
<b>Ethnicity</b>	
Malay	115 (85.8)
Chinese	16 (12.0)
Indian	3 (2.2)
<b>Study programme</b>	
Diploma	59 (44.0)
Degree	75 (56.0)
<b>Duration of practical training (weeks) - Mean <math>\pm</math> SD</b>	24 $\pm$ 3.6

**Table 2:** Level of knowledge and compliance of SP among nursing students

	Diploma students (n=59) n (%)	Degree students (n=75) n (%)
<b>Level of knowledge (Mean <math>\pm</math> SD)</b>	14.7 $\pm$ 2.5	15.4 $\pm$ 2.4
Very good (16-19)	33 (55.9)	43 (57.3)
Good (12-15)	16 (27.1)	25 (33.3)
Fair (8-11)	10 (16.9)	6 (8.0)
Poor (0-7)	0 (0)	1 (1.3)
<b>Level of compliance (Mean <math>\pm</math> SD)</b>	3.6 $\pm$ 0.3	3.7 $\pm$ 0.2
High (4.00-3.51)	53 (89.8)	64 (85.3)
Average (2.51-3.50)	5 (8.5)	11 (14.7)
Low (0-2.50)	1 (1.7)	0

**Table 3:** Percentage of correct answers on knowledge on SP among nursing students (n=134).

No	Items	Diploma (n=59) n (%)	Degree (n=75) n (%)
1	The precautions standard is including the recommendations to protect the patients and healthcare workers.	59 (100.0%)	75 (100.0%)
2	Hand hygiene is recommended before and after contact with (or care of) a patient.	58 (98.3%)	75 (100.0%)
3	When there is a risk of splashes or spray of blood and body fluids, the healthcare workers must wear mask, goggles, and gown	58 (98.3%)	73 (97.3%)
4	Hand hygiene is recommended before or after contact with (or care of) a patient.	38 (64.4%)	27 (36.0%)
5	When there is a risk of splashes or spray of blood and body fluids, the healthcare workers must wear only mask.	9 (15.3%)	14 (18.7%)
6	When there is a risk of splashes or spray of blood and body fluids, the healthcare workers must wear only a gown.	9 (15.3%)	14 (18.7%)

**Table 4:** The three highest and the lowest score on the degree of compliance on standard precautions among nursing students.

No	Compliance with SP	Degree of compliance (n (%))				
		Always	Usually	Sometimes	Seldom	Never
	Diploma nursing students (n = 59)					
1	Washes hand immediately after contacting any blood, body fluid, secretion, excretion, and dirty substances.	57 (96.6)	1(1.7)	1 (1.7)	0	0
2	Wears gloves when comes in contact with blood.	56 (94.9)	2 (3.4)	1 (1.7)	0	0
3	Wears gloves when dressing wounds.	56 (94.9)	0	3 (5.1)	0	0
4	Washes hands after taking off the gloves.	32 (54.2)	26 (44.1)	1 (1.7)	0	0
5	Wears gloves when performing parenteral injection of medications.	30 (50.8)	11 (18.6)	14 (23.7)	3 (5.1)	1(1.7)
6	Wear protective eye patch or google when performing operations/ procedures that might induce spraying of blood, body fluids, secretions, and excretions.	4(6.8)	10 (16.9)	20 (33.9)	11 (18.6)	14 (23.7)
	Degree nursing students (n = 75)					
1	Washes hands when comes in different contact with different patients	75 (100.0)	0	0	0	0
2	Wash hand after taking off gloves	75 (100.0)	0	0	0	0
3	Wears gloves when dressing wounds.	73 (97.3)	2 (2.7)	0	0	0
4	Wears gloves when handling impaired patient skin.	55 (73.3)	9 (12.0)	9 (12.0)	0	2 (2.7)
5	Wears gloves when performing parenteral injection of medications.	29 (38.7)	19 (25.3)	19 (25.3)	1 (1.3)	7 (9.3)
6	Wear protective eye patch or google when performing operations/ procedures that might induce spraying of blood, body fluids, secretions, and excretions.	13 (17.3)	11 (14.7)	8 (10.7)	19 (25.3)	24 (32.0)

**Table 5:** Correlation between knowledge regarding SP, duration of practical training, and compliance with SP among nursing students (n=134).

Variables	Compliance with standard precautions	
	r-value	p-value*
Knowledge regarding SP	-0.104	0.23
Duration of practical training	-0.211	0.02

\*Spearman's Rank-Order Correlation test

## Discussion

Findings from this study revealed that the knowledge level was very good among diploma and bachelor nursing students. This finding is consistent with a previous study about knowledge regarding SP among student nurses at the government's university in Samar, Philippines (10). Study among the nursing population also showed a consistent result as reported by Vaz (14) that 90.0% of nurses had good knowledge of SP. This is in complete disagreement with the finding from a study by Gawad (15) among nurses from Hospitals in Yemen as the majority of the nurses (63.8%) had poor knowledge. They conclude that the low level of knowledge might be due to poor infection control programs and policies and it is attributed to insufficient information of knowledge, lack of training, and continuing education about standard precautions and nosocomial infection (15). Nursing students in USM have been well reinforced regarding SP in their teaching programme and infection control program or policies have been set up well in Hospital USM.

Compliance scores for both groups of nursing students in this study regarding SP were also high. Labrague et al, (10) reported that student nurses have high compliance with SP with a mean of 3.59. This finding is consistent with a previous study among nurses in Ozamiz City, Philippines. Their result showed a very high compliance among nurses in 82.6% of SP activities (19 out of 23 activities) especially in handwashing protocol and personal protection equipment (16).

The majority of respondents for both groups of nursing students in this study were compliance with washes hand immediately after contacting any blood, body fluid, secretion, excretion, and dirty substance and washes hands when comes in different patients. This is consistent with a few findings. Olufime et al (17) in their study stated that hand washes as a vital part of SP were practiced by about half of the respondents before

contact with patients, while 8 in 10 reported hand wash after patient care. However, in term of compliance with hand washes after taking off the gloves, there is a different percentage between degree and diploma nursing students. Hand washing should be carried out before and after the provisions of care as it reduces the count of microorganisms on one's hands, protecting both healthcare professionals and patients from the spread of infection (18).

Nursing students in this study showed variety compliance in term of the practice of wears gloves when performed wound dressing, when comes in contact with blood and when handling impaired patient skin for both groups. Inconsistent with a previous study at a teaching hospital which more than half of respondents (72%) always wear gloves when there is a risk of being contaminated with the blood/body fluids of a patient (19), use of gloves while drawing the blood (81.0%) and when contact with mucous membranes or non-intact skin of the patients (88.3%) (20).

There were low compliance rate among the nursing students in this study on the practices of wear protective eye patch or google when performing operations or procedures that might induce spraying of blood, body fluids, secretions, and excretions. It showed that they do not aware of the importance of wearing a protective eye patch or google when performing operations or procedures that might induce spraying of blood, body fluids, secretions, and excretions. This finding consistent with the study by Labrague et al (10), which are found that low compliance with the use of protective eye patches or eye goggles. This also may due to attribute to the unavailability of personal protective equipment (PPE) in every ward of the hospital. Noncompliance to SP among healthcare workers has been ascribed to several factors in different studies. These include an irregular supply of infection control materials, excess workload, limited personnel, poor supervision, poor compliance by senior colleagues, emergencies, lack of motivation, discomfort with equipment, unexpected body fluid contact, the possibility of inciting fear or offending the patient, time constraint, discomfort of personal protective equipment (PPE), busy work schedule and absence of policy at the workplaces (12,21). Jawaidd (22) concluded that five factors that need be considered to improve compliance level are the availability of equipment, time, ability to remind to comply, applicability, and sufficient knowledge about SP, isolation techniques, and proper waste disposal.

This study also found that there was no significant linear correlation between knowledge and



compliance of practice towards standard precautions among nursing students. Contradict with a study by Balami et al (8) which established the role of knowledge as a determinant of standard precaution practice among undergraduate nursing students and despite the poor knowledge of infectious diseases, the participants still demonstrated an acceptable level of self-reported practice of SP. However, the impact of knowledge on the practice of health care personnel has been debated and concluded in a different view (11,13,23,24). A previous study by Labrague et al (10) also concludes that knowledge on SP does not necessarily affect compliance and application. Knowledge alone may not be a determining factor for the compliance of the standard precaution practices. Nurses, therefore, must possess adequate knowledge and compliance towards achieving the goal of prevention of infections.

The duration of practical training sessions showed a significant correlation with the compliance of practice among nursing students in this study. This research finding contradict to study by Rashmi et al (25) as when the duration of nursing practice increased, it will increase knowledge and compliance. The possible reason of this negative correlation were maybe forgetfulness as the longer duration they were in clinical, they less care about theoretical knowledge they have learned during first year of study. This is supporting by few studies as higher numbers of seminar, conferences or continuous education regarding SP attended by staff did give impact to adherence of good clinical practice (5,6). Thus, this finding is important in emphasizing continuous training regarding SP to nursing students or reminding by supervisor or lecturer during clinical training. Another reason may explain this correlation is inadequate protective material such as PPE in the clinical area as the experienced students will let the new students used it or given priorities to the staff first (4). The compliance with SP is also better with an increase in the duration of nursing practice also seen in another study where the duration of employment played a role in awareness of standard precautions (26). In contrast with Kela et al (27), no significant association between duration of study year and performance of compliance due to few factors such as lack of supervision, lack of established protocols, and an absence of performance appraisal and nursing audit.

### Strengths and Limitations of study

Strength of this study is selection of nursing students using sample random sampling in controlling selection bias. However this study was conducted among nursing students from one university only thus limit the generalizability of

the knowledge and compliance with SP. Besides, the compliance with SP among nursing students are only assessed by self-reported questionnaire and not true realtime observation. This may influence by recall bias or misinterpretation of the practice by individual perceiveness.

### Conclusion

In conclusion, knowledge regarding SP among nursing students in USM was very good for both groups of diplomas and degrees. Nursing students at USM have high compliance regarding standard precautions. There was no significant correlation between the level of knowledge and compliance regarding standard precautions among nursing students. There was a significant correlation between the duration of practical training sessions and compliance with standard precautions.

### Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### REFERENCES

1. Standard Precautions/Universal Precautions. Ann SBV [Internet]. 2012;1(1):20–2. Available from: <http://dx.doi.org/10.5005/jp-journals-10085-1112>
2. Carr-Locke DL, Soetikno R, Sharaiha RZ. Whatever happened to universal/standard precautions? *Gastrointest Endosc.* 2020;92(2):399–400.
3. Melo D de S, Souza ACS e, Tipple AFV, Neves ZCP das, Pereira MS. Nurses' understanding of standard precautions at a public hospital in Goiania - GO, Brazil. *Rev Lat Am Enfermagem* [Internet]. 2006;14(5):720–7. Available from: <http://dx.doi.org/10.1590/s0104-11692006000500013>
4. Chawla S, Verma R, Khanna P. Knowledge and practices regarding standard precautions among health functionaries of peripheral health institutions of Haryana. *Int J Community Med Public Heal* [Internet]. 2017;4(6):2007. Available from: <http://dx.doi.org/10.18203/2394-6040.ijcmph20172166>
5. IS A. Knowledge, Awareness and Compliance with Standard Precautions among Health

- Workers in North Eastern Nigeria. *J Community Med Health Educ* [Internet]. 2012;02(03). Available from: <http://dx.doi.org/10.4172/2161-0711.1000131>
6. Harris SA, Nicolai LA. Occupational exposures in emergency medical service providers and knowledge of and compliance with universal precautions. *Am J Infect Control*. 2010;
  7. Abubakar SM, Haruna H, Robert Teryila K, Hamina D, Ahmadu I, Babaji M, et al. Assessment of knowledge and practice of standard precautions among nurses working at Federal Medical Centre Gombe, Nigeria. *Res J Heal Pharmacol*. 2015;
  8. Balami LG, Ismail S, Saliluddin SM, Garba SH. Role of knowledge and attitude in determining standard precaution practices among nursing students. *Int J Community Med Public Heal* [Internet]. 2017;4(2):560. Available from: <http://dx.doi.org/10.18203/2394-6040.ijcmph20170291>
  9. Atalla HR, Aboalizm SE, Shaban HA. Effect of nursing guidelines compliance to infection control among nursing student. *IOSR J Nurs Heal Sci*. 2016;
  10. Labrague LJ, Rosales RA, Tizon MM. Knowledge and Compliance of Standard Precautions among Student Nurses. *Int J Adv Nurs Stud* [Internet]. 2012;1(2). Available from: <http://dx.doi.org/10.14419/ijans.v1i2.132>
  11. Sax H, Perneger T, Hugonnet S, Herrault P, Chraïti M-N, Pittet D. Knowledge of Standard and Isolation Precautions in a Large Teaching Hospital. *Infect Control Hosp Epidemiol* [Internet]. 2005;26(3):298-304. Available from: <http://dx.doi.org/10.1086/502543>
  12. Luo Y, He GP, Zhou JW, Luo Y. Factors impacting compliance with standard precautions in nursing, China. *Int J Infect Dis* [Internet]. 2010;14(12):e1106-14. Available from: <http://dx.doi.org/10.1016/j.ijid.2009.03.03>
  13. Mukthar VK. The Effect of an Educational Intervention on the Standard Precautions among Nurses in Kenya. *Biomed J Sci Tech Res* [Internet]. 2017;1(4). Available from: <http://dx.doi.org/10.26717/bjstr.2017.01.000346>
  14. Vaz K, McGrowder D, Crawford T, Alexander-Lindo R, Irving R. Prevalence of injuries and reporting of accidents among health care workers at the University Hospital of the West Indies. *Int J Occup Med Environ Health* [Internet]. 2010;23(2). Available from: <http://dx.doi.org/10.2478/v10001-010-0016-5>
  15. Gawad A. Assessment of Knowledge about Standard Precautions and Nosocomial Infection among Nurses Working in Hospitals of Sana'a City, Yemen. *J Caring Sci Int*. 2017;
  16. Pasay JME, Robles CJ, Awa AL, Enguito MRC. Compliance with Standard Precautions Among Hospital Nurses in Ozamiz City, Philippines. *J Multidiscip Stud* [Internet]. 2015;4(1). Available from: <http://dx.doi.org/10.7828/jmds.v4i1.855>
  17. Aluko OO, Adebayo AE, Adebisi TF, Ewegbemi MK, Abidoye AT, Popoola BF. Knowledge, attitudes and perceptions of occupational hazards and safety practices in Nigerian healthcare workers. *BMC Res Notes*. 2016;
  18. Efsthathiou G, Papastavrou E, Raftopoulos V, Merkouris A. Factors influencing nurses' compliance with Standard Precautions in order to avoid occupational exposure to microorganisms: A focus group study. *BMC Nurs* [Internet]. 2011 Jan 21;10:1. Available from: <https://pubmed.ncbi.nlm.nih.gov/21255419>
  19. ARIF A., SHAH S. I. A. MAACAS. No Title. *Biomedica*. 2017.
  20. Punia S, Nair S, Shetty RS. Health Care Workers and Standard Precautions: Perceptions and Determinants of Compliance in the Emergency and Trauma Triage of a Tertiary Care Hospital in South India. *Int Sch Res Not* [Internet]. 2014 Oct 29;2014:685072. Available from: <https://pubmed.ncbi.nlm.nih.gov/27433500>
  21. Aung SS, Nursalam N, Dewi YS. FACTORS AFFECTING THE COMPLIANCE OF MYANMAR NURSES IN PERFORMING STANDARD PRECAUTION. *J Ners* [Internet]. 2017;12(1):1. Available from: <http://dx.doi.org/10.20473/jn.v12i1.2294>
  22. Jawaaid M, Iqbal M, Shahbaz S. Compliance with standard precautions: A long way ahead. *Iran J Public Health*. 2009;
  23. Suchitra JB, Lakshmi Devi N. Impact of education on knowledge, attitudes and practices among various categories of health care workers on nosocomial infections. *Indian J Med Microbiol* [Internet]. 2007;25(3):181. Available from: <http://dx.doi.org/10.4103/0255-0857.34757>
  24. Amin TT, Al Noaim KI, Bu Saad MA, Al Malhm TA, Al Mulhim AA, Al Awas MA. Standard precautions and infection control, medical students' knowledge and behavior at a Saudi university: the need for change. *Glob J Health Sci* [Internet]. 2013 Apr 21;5(4):114-25. Available from: <https://pubmed.ncbi.nlm.nih.gov/23777728>
  25. Rashmi A, Kundapur R. Factors influencing observation of standard precautions among nursing staff in tertiary care setting in

- Mangalore. Int J Community Med Public Heal. 2017;
26. Faiza Ali Nasor Taha. Impact of Universal Precautions Training Program on Nurse Midwives Performance during Labor in Khartoum State – Sudan 2006-2009. J US-China Med Sci. 2014;
  27. Kale M, Gholap M, Shinde M. Knowledge and practices of universal precautions among basic B. Sc. nursing students. Int J Sci Res. 2012;