



RESEARCH ARTICLE

## Nurses' Knowledge Regarding Infection Control Standard Precautions at Shar Teaching Hospital in Sulaimani City

Zanwer Sabir Abdulqadir<sup>1</sup> , Atiya Kareem Mohammed<sup>2</sup> \*

1. Department of Adult Nursing, College of Nursing, University of Sulaimani, City of Sulaimani, Iraq;

2. Department of Maternal Neonatal Nursing, College of Nursing, University of Sulaimani, New Sulaimani, 46001, Sulaymaniyah, Iraq

\*Correspondence should be addressed to Atiya Kareem Mohammed,

E.mail: [atiya.mohammed@univsul.edu.iq](mailto:atiya.mohammed@univsul.edu.iq)

### ABSTRACT

**Background:** Healthcare-associated infections (HAIs) are a major public health problem that can affect a patient's health and quality of life. All healthcare providers should be concerned about patient safety and use standard precautions to minimize infection.

**Aim:** The present study aims to evaluate nurses' Knowledge regarding infection control standard precautions at Shar Teaching Hospital in Sulaimani City.

**Methods:** A descriptive observational design used in this study includes 212 nurses in all departments of Shar Teaching Hospital in Sulaimani city. A probability, the stratified random sampling method is used and the data were collected from 15<sup>th</sup> March 2022 to 20<sup>th</sup> September 2022 using a related questionnaire; the questionnaire was composed of three parts, including sociodemographic data, information about the setting of the study, and information related to Knowledge of standard precautions. The data were analyzed by SPSS, version 24.

**Results:** The result of this study indicates that 12.3% of the nurses had poor Knowledge, 30.2% had fair Knowledge, and 57.5% had good Knowledge regarding infection control standard precautions.

**Conclusion:** The present study concludes that the majority of the nurses had good Knowledge regarding infection control standard precautions, and there was a significant association between the level of Knowledge of the nurses and their level of education. Therefore, it is recommended to provide training programs on standard precautions for newly employed nurses at regular intervals, and guideline posters are available for nurses to follow.

**Keywords:** infection control, standard precautions, nurses.



This work is licensed under a Creative Commons Attribution Non-Commercial 4.0 International License.

Received: 23 November 2022, Revised: 12 February 2023, Accepted: 19 February 2023, Available online: 28 July 2023

## INTRODUCTION

Nurses are at the core of patient care, and they're the ones most likely to identify faults and protect patients from damage. The concept of safety is crucial in nursing, both for the care of clients and for the safety of care professionals. Meanwhile, patient safety procedures are "those that lower the risk of adverse outcomes connected to medical care exposure across a spectrum of diseases or disorders. Health-associated infection (HAI) prevention has become a main concern in patient safety. Standard precautions, policies, protocols, and procedures aimed at preventing and managing infections and transmission of illnesses in healthcare settings are referred to as infection control. Any delay in the implementation of infection control practices might have serious negative consequences (Ibrahim Ezz Eldeen, 2016).

Healthcare-associated infections (HAIs) continue to be the most common adverse event in any healthcare system, affecting millions of individuals each year and causing significant morbidity and mortality (Haile T., 2017).

All healthcare providers are concerned about patient safety. It is, therefore, critical for nurses. They give healthcare services to their consumers in hospitals and other healthcare settings 24 hours a day, seven days a week. Every hospital's "heart and soul" is considered to be its nurses. Nurses' Knowledge and behaviours play an important role in infection control, which improves patient care quality. Nurses, on the other hand, have a unique opportunity to reduce the risk of hospital-acquired infections. They can aid patients in their rehabilitation and decrease infection-related problems by utilizing appropriate Knowledge and techniques (Sadia H., 2017).

A collection of preventive measures aimed at avoiding the spread of infectious diseases is known as standard precautions. Standard precautions include wearing gloves, aprons, and goggles, as well as handling contaminated instruments (needles and sharps), housekeeping with adequate cleaning protocols, and strictly adhering to standard practices. This necessitates the availability of protective equipment, proper healthcare professional training, and adherence to sterilization and disinfection practices (Asmr et al., 2019).

Nursing monitoring is critical for patient safety because nurses can avoid iatrogenic injury and protect patients in hospitals from medical mistakes made by others. The demands of the profession, which include continuous, careful monitoring of the patient, dynamic data analysis, anticipating difficulties, complex decision-making, continual review of interventions, and emotional support for the patient and family, impact nurses' role in patient safety (Adly et al., 2020).

## Aim of the study:

To evaluate Nurses' Knowledge Regarding Infection Control Standard Precautions at Shar Teaching Hospital in Sulaimani City.

## METHOD

**Research design:** A descriptive observational design.

**Research setting:** The study was conducted at Shar Teaching Hospital in Sulaimani City, which consists of 400 beds. It is a multi-department hospital that consists of an emergency, Medical Ward, Surgical Ward, ICU, CCU, Urology, Nephrology, Dialysis, Neurology, Neurosurgery, Orthopedic, Operation Room, and Outpatient) departments, Shar Teaching Hospital, receives all kinds of patients regardless of whether they have an infection.

**Sample size:** The sample size was 212 nurses from each department of Shar Teaching Hospital; they were chosen according to the inclusion and exclusion criteria of the research.

**Sample type:** A probability, stratified random sampling.

## The Study Instruments and Tools:-

A questionnaire used in this study, which is consisted of three parts.

### Part I: (Sociodemographic Data)

This part includes demographic data of nurses, and it consisted of (14) items, including age, gender, level of education, marital status, working department, employment, working shifts, and items about training and years of experience.

### Part II: (Information Related to the Setting of the Study)

This part includes (7) items that consist of an educational program availability of guidelines, Personal Protective Equipment (PPE) and Hand Washing, items related to the availability of suitable waste bins according to the type of waste, and central sterilization supply department (CSSD).

### Part III: (information related to Knowledge of standard precautions)

This part was designed to include (30) questions related to the Knowledge of infection control standard precautions, which were based on the extensive review of the literature and related previous studies.

## Validity of the questionnaire

The content validity of the study instrument (questionnaire) was determined by the panel of (10) experts who have experience in their fields to investigate the content of the questionnaire. The

questionnaire was reviewed by the experts for face and content clarity, relevance, and adequacy to achieve the study objectives. The outcome indicated that the experts agreed on the tool items. Except for a few changes, the investigator considered their responses and suggestions, and some changes were made to the tools.

### Pilot study

A pilot study was carried out on (20) nurses at Shar Teaching Hospital. The pilot study aimed to achieve the following aims:

1. To determine the reliability of the questionnaire.
2. To evaluate the time required for data collection.
3. To know whether items of the questionnaire are clear, understood, and applicable.
4. To identify the barriers and difficulties facing the researcher during data collection.

The nurses filled out the questionnaire. The results of the pilot study revealed that the items of the questionnaire were clear and understandable to the nurses. The time required to fill out the questionnaire by the nurses is approximately around (15) minutes. The sample of the pilot study was excluded from the original sample of the present study.

Cronbach's alpha was used to obtain the final result of reliability, the information of the question was obtained from the participation twice to make the honours of the respondents, and the result of the reliability was 0.904. As a result, the respondents to the questionnaire were reliable.

### Statistical Methods

The statistical analysis in this study was conducted using SPSS version 24, which significantly enhanced the computation of various statistical methods. The data underwent coding, tabulation, and presentation in a descriptive format. The inferential data analysis involved two key statistical procedures: the Chi-Square Test and Spearman Rank correlation. To determine the significance of these tests, specific criteria were applied based on the p-value, with results categorized as follows: High significance ( $P < 0.001$ ), Significant ( $P < 0.05$ ), Non-significant ( $P > 0.05$ ), and Very highly significant ( $P < 0.000$ ). These statistical methods and significance levels were employed to draw meaningful conclusions from the study's data.

### Limitations of the study

During the course of the study, the researcher encountered several challenges and barriers. Firstly, nurses' limited availability to complete questionnaires, particularly in high-pressure environments like emergency units and operating

rooms, posed a significant hurdle. Secondly, the study's small sample size hindered the ability to generalize the findings to a broader population. Additionally, some nurses declined to participate due to concerns about divulging personal information and worries about having their names included in hospital directories. Another obstacle was the scarcity of recent study references directly relevant to the research topic. Lastly, logistical issues related to transportation also presented difficulties for the researcher throughout the study. These challenges collectively influenced the research process and outcomes.

### RESULTS

Table (1) shows the nurse's socio-demographic characteristics. The age of the majority of the participants was between 30 – 40 years old, representing (60.4%) and only 26.4% were less than 30 years old. Regarding education, the majority of the nurses graduated from an institute (65.6%). Most participants in the study (67.0%) were females. (20.8%) of the nurses worked in the operation department, (10.4%) of the participants worked in the neurology department, and (0.9%) of the nurses worked in the OGD department. (72.2%) of the participants are married. Most participants (86.3%) of the nurses were employed by the government.

Table (2) represents the distribution of characteristics related to the nurse profession and years of experience. Most participants (67.5%) of the nurses were working the afternoon shift. Only (31.1%) of nurses work in a private clinic. In addition, the majority of the total years of service was between (5 and 10) years, which equalled (63.7%). Most participants (37.2%) of nurses had more than 6 years of service (experience) at Shar Teaching Hospital. On the other hand, (30.2%) of nurses had infection control training, (26.56%) of the nurses had more than 10 days of the infection control course, and (57.8%) of nurses had between 3 and 6 years since the last training. However, (89.6%) of nurses had prior infection control information, (55.4%) of the nurses had studied to receive information about infection control, and (98.1%) of nurses were exposed to infection while working in the hospital.

Table (3) illustrates the distribution of characteristics related to information about the setting of the study. All of the participants (100.0%) of the nurses said that they did not have a regular departmental training program on infection control, and (58%) of nurses did not have an infection control policy in the unit. On the other hand, The majority of personal protective equipment was a surgical mask (13.28%) and (13.22%) were clean gloves available as personal protective equipment, (25.5%) of participants had hand rubs with alcohol to wash equipment, and (25.37%) of participants had sinks with running water to wash equipment and only (24.5%) of participants had soap to wash equipment

disposal. Additionally, the majority of the waste bins were medical waste yellow represented (49.53%), and (49.06%) was general waste black. Most of the participants (100%) of the departments have a sharp disposal box. Then (100.0%) of the participants have the central sterilization supply department available.

Table (4) demonstrates the result of the Knowledge of the nurses regarding infection control standard precautions, which indicates that 12.3% of the nurses had poor Knowledge, 30.2% had fair Knowledge, and 57.5% had good Knowledge regarding infection control standard precautions.

Table (5) shows the association between the Knowledge of nurses and socio-demographic

characteristics. A result shows that there was a statistically significant association between nurses' Knowledge and their level of education (p-value=0.000) because the result of the p-value was less than the common alpha of 0.05. While, there was no statistically significant association between nurse's Knowledge related to age (p-value=0.063), gender (p-value=0.743), marital status (p-value=0.434), and employment (p-value=0.49) because the result of p-value was more than the common alpha 0.05.

**Table (1): socio-demographic characteristics of nurse participants**

Characteristics	Frequency	%
<b>Age (Years)</b>		
< 30	56	26.4
30 – 40	128	60.4
More than 40	28	13.2
<b>Mean ± S.D</b>	33.41 ~ 33 ± 6.47	
<b>Level of education</b>		
Nursing School graduated	0	0.0
Secondary Nursing School graduated	6	2.8
Nursing and Midwifery Institute graduated	139	65.6
College of Nursing graduated	67	31.6
Master and more	0	0.0
<b>Gender</b>		
Male	70	33.0
Female	142	67.0
<b>Department of</b>		
cardiothorasic+neurosurgery	17	8.0
cath lab	6	2.8
Dialysis	10	4.7
emergency medicine	12	5.7
Icu	8	3.8
medical ward	16	7.5
Neurology	22	10.4
Old	2	.9
Operation	44	20.8
orthopedic+ surgery	19	9.0
short stay	18	8.5
surgery emergency	11	5.2
Trauma	21	9.9
Triage	6	2.8
<b>Marital Status</b>		
Married	153	72.2
Single	59	27.8
Separated or Widowed	0	0.0
<b>Employment</b>		
Government	183	86.3
Contract	29	13.7
<b>Total</b>	<b>212</b>	<b>100.0</b>

**Table (2): Distribution of characteristics related to the nurse profession and years of experience**

Characteristics	Frequency	%
<b>Working Shifts</b>		
Morning shift	69	32.5
Afternoon shift	143	67.5
<b>Are you working with a private hospital</b>		
Yes	66	31.1
No	146	68.9
<b>Number of years of total service</b>		
< 5	22	10.4
5 – 10	135	63.7
> 10	55	25.9
<b>Mean ± S.D</b>	9.61 ~ 10 ± 5.59	
<b>Number of years of service (experience) in the Shar Hospital</b>		
< 3	61	28.8
3 – 6	72	34.0
> 6	79	37.2
<b>Mean ± S.D</b>	5.24 ~ 5 ± 3.12	
<b>Training courses related to infection control</b>		
Yes	64	30.2
No	148	69.8
If yes: - Total duration of the course (Days)		
< 5	25	39.06
5 – 10	22	34.38
> 10	17	26.56
<b>Total</b>	<b>64</b>	<b>100.0</b>
<b>Time from last training (Years)</b>		
< 3	18	28.13
3 – 6	37	57.81
> 6	9	14.06
<b>Total</b>	<b>64</b>	<b>100.0</b>
<b>Do you have previous information about infection control</b>		
Yes	190	89.6
No	22	10.4
If yes, where did you get the information		
Studying	153	55.4
Workshop	22	8.0
Training and development	61	22.1
Audio and visual media	30	10.9
Others	10	3.6
<b>Total</b>	<b>276</b>	<b>100</b>
<b>Did you get exposed to blood and body fluids while working in a hospital</b>		
Yes	208	98.1
No	4	1.9
<b>Total</b>	<b>212</b>	<b>100.0</b>

**Table (3): Distribution of characteristics related to information about the setting of the study**

Characteristics	Frequency	%
<b>Do you have a periodic educational program in your department regarding infection control</b>		
Yes	0	0.0
No	212	100.0
<b>Are infection control guidelines available in your department</b>		
Yes	89	42.0
No	123	58.0
<b>Does Personal Protective Equipment (PPE) available in your department</b>		
Surgical Mask	211	13.28
N95 mask	44	2.77
Clean Gloves	210	13.22
Sterile gloves	206	12.96
Gown	203	12.78
Goggles	74	4.66
Apron	92	5.79
Face shield	60	3.78
Caps	112	7.05
Shoe cover	93	5.85
Boots	51	3.21
Clinical waste bag	196	12.33
Full cover gown	37	2.33
<b>Total</b>	<b>1589</b>	<b>100.0</b>
<b>Is hand washing equipment available in your department</b>		
Sink with running water	205	25.37
Soap	198	24.50
Tissue	199	24.63
Alcohol hand rubs	206	25.50
<b>Total</b>	<b>808</b>	<b>100.0</b>
<b>Does your department have different waste bins according to the type of waste</b>		
Medical waste yellow	211	49.53
General waste black	209	49.06
Glass waste blue	4	0.94
Infectious waste red	2	0.47
<b>Total</b>	<b>426</b>	<b>100</b>
<b>Does your department have a sharp box for sharp disposals</b>		
Yes	212	100.0
No	0	0.0
<b>Is the central sterilization supply department (CSSD) available at the hospital</b>		
Yes	212	100.0
No	0	0.0
<b>Total</b>	<b>212</b>	<b>100.0</b>

**Table (4): Distribution of Knowledge of the nurses according to learning activities and experience of nurses.**

Knowledge of nurses	No	Yes	Total score	Results
	Fr.	Fr.		
	%	%		
1. Standard precautions are used for the care of all patients regardless of their diagnosis and perceived infection status.	61 28.77	151 71.23	151	Fair
2. Disinfection prevents hospital-acquired infection	30 14.15	182 85.85	182	Good
3. Antiseptics prevent hospital-acquired infection	68 32.08	144 67.92	144	Fair
4. Standard precaution is only applicable to patients with a confirmed diagnosis of infection in the latent period of infection ( <b>No</b> )	104 49.06	108 50.94	104	Poor
5. The main goal of implementing standard precautions is to protect the medical staff. ( <b>No</b> )	99 46.70	113 53.30	99	Poor
6. All healthcare providers are at increased risk of getting HIV/HBV/HCV infection and other occupational infections.	25 11.79	187 88.21	187	Good
7. All body fluids should be considered infectious	55 25.94	157 74.06	157	Fair
8. All patients are infectious regardless of their diagnosis	110 51.89	102 48.11	102	Poor
9. Infectious organisms can be found on the normal intact skin of patients and HCWs	59 27.83	153 72.17	153	Fair
10. The use of gloves replaces the need for hand washing ( <b>No</b> )	157 74.06	55 25.94	157	Fair
11. Hand washing reduces the chances of hospital-acquired infections	36 16.98	176 83.02	176	Good
12. The gloves shall be worn in the operation of blood drawing, venous puncture,	32 15.09	180 84.91	180	Good
13. Washing hands after contact with the patient's environment is one of the elements in standard precaution	30 14.15	182 85.85	182	Good
14. Alcohol-based rubs are used after removing gloves	64 30.19	148 69.81	148	Fair
15. Performing hand hygiene is required before and after patient care	31 14.62	181 85.38	181	Good
16. Hands should be washed with soap and water before and after handling potentially infectious materials, irrespective of wearing gloves.	25 11.79	187 88.21	187	Good
17. PPE is important in infection control because it acts as a barrier between infectious materials such as viral and bacterial contaminants and your skin, mouth, nose, or eyes	30 14.15	182 85.85	182	Good
18. Goggles must be worn every time handling potentially infectious materials	21 9.91	191 90.09	191	Good
19. Gloves must be changed during patient care if you move hands from 'contaminated body site' to 'clean body site'	22 10.43	190 89.57	189	Good



Nurses' Knowledge Regarding Infection

20. Surgical masks can protect the nose and mouth when procedures and activities are likely to generate splashes or sprays of blood and body fluids.	27	185	185	Good
	12.74	87.26		
21. The mask must be placed on coughing patients to prevent the potential dissemination of infectious respiratory secretions from the patient to others.	24	188	188	Good
	11.32	88.68		
22. The purpose of using a gown or apron is to protect clothes from splashes or sprays of blood and body fluids.	28	184	184	Good
	13.21	86.79		
23. Removed all personal protective equipment (PPE) before leaving the patient's environment	111	101	101	Poor
	52.36	47.64		
24. Stationary, telephones kept inwards, and doorknobs can be sources of infections.	27	185	185	Good
	12.74	87.26		
25. All linen from an infectious patient should be thrown in a red linen bag even when it is free from visible blood or body fluids.	23	189	189	Good
	10.85	89.15		
26. Segregation of clinical and non-clinical waste is important for preventing the spread of infection.	20	192	192	Good
	9.43	90.57		
27. Ampoules injection that has been used must be disposed of in the clinical waste bin.	70	142	142	Fair
	33.02	66.98		
28. Recapping of needles, in general, is not appropriate	124	88	88	Poor
	58.49	41.51		
29. If you puncture your hand with sharp instruments, you must report it to the concerned authorities.	58	154	154	Fair
	27.36	72.64		
30. Puncture-proof containers should be used for the disposal of sharps objects.	8	204	204	Good
	3.77	96.23		

Nott// Sample(212), Correct Answer (1) and Incorrect Answer (0), Then the total score (212), The scale of Knowledge of nurses was classified as poor Knowledge (<50%) with a score (of 0 – 105), Fair Knowledge (50% - < 75%) with a score (of 106 – 158) and good Knowledge (≥ 75%) with a score (159-212),

**Table (5): Association between the Knowledge of nurses and demographic characteristics**

Variables	Items	Score of Knowledge						Significant Test
		Poor		Fair		Good		
		Fr.	%	Fr.	%	Fr.	%	
<b>Age (Years)</b>	< 30	12	46.15	15	23.44	29	23.77	$\chi^2 = 8.931$ P=0.063
	30 – 40	11	42.31	44	68.75	73	59.84	
	More than 40	3	11.54	5	7.81	20	16.39	
<b>Level of education</b>	Secondary Nursing School	3	11.54	2	3.13	1	0.82	$\chi^2 = 29.552$ P=0.000
	Nursing and Midwifery Institute	15	57.69	55	85.94	67	54.92	
	College of Nursing	8	30.77	7	10.94	54	44.26	
<b>Gender</b>	Male	10	38.46	22	34.38	38	31.15	$\chi^2 = 0.595$ P=0.743
	Female	16	61.54	42	65.63	84	68.85	
<b>Marital Status</b>	Married	16	61.54	47	73.44	90	73.77	$\chi^2 = 1.67$ P=0.434
	Single	10	38.46	17	26.56	32	26.23	
<b>Employment</b>	Government	21	80.77	54	84.38	108	88.52	$\chi^2 = 1.386$ P=0.49
	Contract	5	19.23	10	15.63	14	11.48	
<b>Total</b>		26	100	64	100	122	100	

Significant Test at the level of significant 0.05, If (P-value <0.05) is significant The significant Test is the Chi-Square Test.



## DISCUSSION

In the present study, the knowledge of 212 nurses regarding infection control standard precautions was evaluated through a questionnaire; regarding the result of the sociodemographic data of this study, the majority of the participants (60.4%) were between (30-40) years old, most them (65.6%) had diploma degree, gender-wise the females were more than males with the percentage of (67.0%), majority of the nurses (72.2%) were married, similar to this study is a study done in Egypt the results demonstrate that 46.4% of the research nurses were between the ages of 30 and 39, 71.3% were female, 76.2% were married, and 52.5% had a nursing diploma (Azab et al., 2021).

While a study was done in Saudi Arabia with opposite results to this study, results show that more than half of nurses (59.9%) were aged less than 30 years, and (55.7%) were males. Most of the participants (45.3%) had Bachelor's degrees (Al-Ahmeri, 2017).

Regarding the working shifts of the nurses, most of the nurses (67.5%) were on night shifts, but in a study done in Egypt, most of the nurses were on morning shifts (El-Enein & El Mahdy, 2011).

As for working experience, the result of this study shows that (63.7%) of the nurses have worked between (5-10) years total, and the majority of the nurses (69.8%) have not participated in an infection control training course, although there was no periodic educational program in any of the departments of Shar Teaching Hospital regarding infection control, which is opposite to the result of a study done by Yohanis Asmr in Ethiopia, while the majority (74.0%) had less than five years of experience and most of them (62.6%) have participated in training regarding infection control (Asmr et al., 2019).

However, in a study done in Egypt, the result is quite similar to this study as (40.0%) of the nurses have less than 10 years and more than five years of experience. Also, most of them (80.0%) have not participated in the training course regarding infection control (Mohammed Ali Hassan et al., 2022).

About exposure of the nurses to blood and body fluids while working in a hospital, the majority of them (98.1%) answered yes, which is opposite to the result of the study held in Nigeria, in which the result comes out to be (94.8%) not exposed (Amaran & Onwube, 2013).

Information related to the setting of the study was collected through seven questions regarding periodic educational programs. All the nurses answered with (No), which means there is no educational program regarding infection control in any of the departments of Shar Teaching Hospital. (58.0%) of the nurses mentioned that there is no guideline in their department, while in research in

Egypt, all the nurses mentioned that there are guidelines in their departments (Adly et al., 2020).

Regarding the availability of personal protective equipment, surgical masks, clean gloves, sterile gloves, gowns, and clinical waste bags were available in almost all the departments, but there was a lack of other personal protective equipment. A study proved that a lack of personal protective types of equipment was significantly associated with compliance (Haile T., 2017).

However, hand-washing equipment was available in all departments, which is a good indicator that there is no barrier for the nurses to perform hand washing. It is proven by research that a lack of hand-washing equipment is agreed to be a strong barrier to performing hand washing (Azab et al., 2021).

All the departments had medical (yellow) and general (black) waste bins, while there was a lack of glass (blue) and infectious (red) waste bins in almost all the departments. However, poor medical waste management is related to the absence of waste management and disposal systems. Also the topic is a low priority in many countries (Babanyara et al., 2013).

On the other hand, the sharp box was available in all departments, similar to the result of a study done in Palestine (97.4%) of the nurses answered the availability of sharp box in their departments (Fashafsheh Ahmad Ayed & Eqtaib Lubna Harazneh 2015).

Central sterilization supply department was available at Shar Teaching Hospital. The central sterile supply department (CSSD) has a critical role in sterilizing and delivering expensive medical equipment to various users throughout the hospital (Krageschmidt et al., 2014).

Knowledge of the nurses was assessed through 30 questions about the aspects of standard precautions. the result of this study indicates that 12.3% of the nurses had poor Knowledge, 30.2% had fair Knowledge, and 57.5% had good Knowledge regarding infection control standard precautions, in a study held in a university in Qassim, Saudi Arabia, the result of the Knowledge regarding standard precautions was close to the result of this study, 6.1% had poor Knowledge, 26.3 had fair Knowledge and 67.6% had good Knowledge (Abalkhail et al., 2021).

While in another study done in India, the majority 61.67%, had fair Knowledge regarding aspects of infection control standard precautions (Sherwani et al., 2018).

The results of a study done at Sulaimani Teaching Hospital confirmed that nurses have an important role in patient safety while they are in the hospital (Atiya, 2016).

According to the result of this study, there was a significant association between the level of

Knowledge of the nurses and their level of education (p-value= 0.000), while there was no significant association between nursing knowledge in related to age (p-value=0.063), gender (p-value=0.743), marital status (p-value=0.434) and employment (p-value=0.49), supported by a study done in Nigeria that the results show that There was a statistically significant relationship between education level and Knowledge of standard precautions (p= 0.019) (Osagiede et al., 2020).

In a study done in Iran, their result shows that Knowledge and gender have a significant relationship (p = 0.02). Furthermore, no significant relationship was found between the level of Knowledge and age, marital status, employment, work experience, education, and place of employment (Sarani et al., 2015).

Although, in another study done in Egypt the result demonstrates that, there was a highly statistically significant relationship (P 0.01) between the total Knowledge of the nurses studied, years of experience, and job title. There was also a statistically significant relationship between their age and marital status (P 0.05). However, there was no significant relationship with their gender (P >0.05) (Adly et al., 2020).

However, in another study held in India, The level of Knowledge increased significantly with increasing age and duration of work experience (p-value < 0.05) (Sherwani et al., 2018).

### CONCLUSIONS

The results of the present study conclude that the majority of the nurses had good Knowledge regarding infection control standard precautions, and there was a significant association between the level of Knowledge of the nurses and the level of education, while there was no significant association between Knowledge and age, gender, marital status, and employment.

### RECOMMENDATION

Providing training programs on standard precautions for newly employed nurses at regular intervals.

The nurses of Shar Teaching Hospital are continuously being evaluated for their Knowledge of standard precautions.

The availability of guideline posters for nurses to follow to conform with the use of standard precautions at Shar Teaching Hospital.

Future research is to be conducted to determine the obstacles and barriers to the development of nurses' Knowledge regarding infection control standard precautions.

### Ethical Approval Statement

This research study, titled " **Nurses' Knowledge Regarding Infection Control Standard Precautions at Shar Teaching Hospital in Sulaimani City** " conducted by [Zanwer Sabir Abdulqadir<sup>1</sup> , Atiya Kareem Mohammed<sup>2</sup>], has received ethical approval from the [The Ethical Committee of College Of The Medicine] at [University of Sulaimani].

### FUNDING

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

### AUTHOR'S CONTRIBUTIONS

Study concept, Writing, and Review the final edition by all authors.

### DISCLOSURE STATEMENT:

All authors contributed equally to the conception and design of the study, data collection, and analysis, and drafted the initial manuscript. All authors critically reviewed and edited the manuscript. All authors approved the final version of the manuscript for submission.

### Acknowledgements

We thank all Shar Teaching Hospital staff in Sulaimaniyah City, Iraq, for their kind help and support for this study.

### REFERENCES

- Abalkhail, A., Al Imam, M. H., Elmosaad, Y. M., Jaber, M. F., Al Hosis, K., Alhumaydhi, F. A., Alslamah, T., Alamer, A., & Mahmud, I. (2021). Knowledge, attitude and practice of standard infection control precautions among health-care workers in a university hospital in Qassim, Saudi Arabia: A cross-sectional survey. *International Journal of Environmental Research and Public Health*, 18(22), 1–13. <https://doi.org/10.3390/ijerph182211831>
- Adly, R. M., Ismail, S. S., Mohamed, S., & Saleh, A. (2020). *Assessment of Nurses' Knowledge and Practices Regarding the Application of Safety Standard Precautions in Pediatric Critical Care*. 7(3), 524–543.
- Al-Ahmeri, A. M. (2017). Knowledge, attitude and practice about infection control among primary care professionals in Abha City, Kingdom of Saudi Arabia Ahmed. *Journal of Family Medicine and Primary Care*, 6(2), 169–170. <https://doi.org/10.4103/jfmpc.jfmpc>
- Amoran, O. E., & Onwube, O. O. (2013). Infection control and practice of standard precautions among healthcare workers in northern

- Nigeria. *Journal of Global Infectious Diseases*, 5(4), 156–163. <https://doi.org/10.4103/0974-777X.122010>
- Asmr, Y., Beza, L., Engida, H., Bekelcho, T., Tsegaye, N., & Aschale, Y. (2019). Assessment of Knowledge and Practices of Standard Precaution against Blood Borne Pathogens among Doctors and Nurses at Adult Emergency Room in Addis Ababa, Ethiopia. *Emergency Medicine International*, 2019, 1–8. <https://doi.org/10.1155/2019/2926415>
- Atiya, K. M. (2016). *International Journal of Nursing and Midwifery - maternal satisfaction regarding quality of nursing care during labor and delivery in Sulaimani Teaching Hospital*.
- Azab, W. A., Soliman, N. M., & Melika, F. F. (2021). *Improving Nurses ' Performance to Use Infection Control Standard Precautions in Emergency Unit*. 8(1), 537–546.
- Babanyara, Y. Y., Ibrahim, D. B., Garba, T., Bogoro, A. G., & Abubakar, M. Y. (2013). *Poor Medical Waste Management ( MWM ) Practices and Its Risks to Human Health and the Environment : A Literature Review*. 11, 757–764.
- El-Enein, N. Y. A., & El Mahdy, H. M. (2011). Standard precautions: A KAP study among nurses in the dialysis unit in a University Hospital in Alexandria, Egypt. *Journal of the Egyptian Public Health Association*, 86(1–2), 3–10. <https://doi.org/10.1097/01.EPX.0000395430.92943.69>
- Fashafsheh Ahmad Ayed, I., & Eqtait Lubna Harazneh, F. (2015). *Knowledge and Practice of Nursing Staff towards Infection Control Measures in the Palestinian Hospitals*. 6(4), 79–91.
- Haile T., A. A. (2017). Compliance with standard safety precautions and associated factors among health care workers in Gondar University comprehensive, specialized hospital, Southern Ethiopia. *PLoS ONE*, 15(10) (October). <https://doi.org/10.1371/journal.pone.0239744>
- Ibrahim Ezz Eldeen, A. (2016). Evaluation of an Infection Control Measures Protocol Application by Nurses on Patients' Safety at Burn Units. *Journal of Surgery*, 4(3), 1. <https://doi.org/10.11648/j.js.s.2016040301.1>
- Krageschmidt, D. A., Kubly, A. F., Browning, M. S., Wright, A. J., Detmer, M. J., & McCoy, W. F. (2014). Reply to Shelton. *Infection Control & Hospital Epidemiology*, 35(10), 1311–1312. <https://doi.org/10.1086/678074>
- Mohammed Ali Hassan, A., Abdel Halim Mostafa Ahmed, F., A. Hamed, L., & Mohammed Abo El-elle Mohammed, M. (2022). Web-Based Intervention Improves Surgical Units Nurses' Performance about Infection Control Precautions during Coronavirus Outbreaks. *Egyptian Journal of Health Care*, 13(1), 1626–1637. <https://doi.org/10.21608/ejhc.2022.230016>
- Osagiede, E., Utomi, S., Egbuta, O., Osagiede, E., Airefetalor, I., & Abah, S. (2020). Knowledge and Practice of Standard Precautions for Infection Prevention and Control among Health Care Workers in Public Primary and Secondary Health Facilities in Edo State: A Reflection of the Neglect of First and Second Levels of Care in Infection Preve. *Journal of BioMedical Research and Clinical Practice*, 3(4), 435–443. <https://doi.org/10.46912/jbrcp.199>
- Sadia H., K. R. (2017). Assessment of Nurses' Knowledge and Practices Regarding Prevention of Surgical Site Infection. *Saudi J. Med. Pharm. Sci*, July, 585–595. <https://doi.org/10.21276/sjmps>
- Sarani, H., Balouchi, A., Masinaeinezhad, N., & Ebrahimitabas, E. (2015). Knowledge, Attitude and Practice of Nurses about Standard Precautions for Hospital-Acquired Infection in Teaching Hospitals Affiliated to Zabol University of Medical Sciences (2014). *Global Journal of Health Science*, 8(3), 193–198. <https://doi.org/10.5539/gjhs.v8n3p193>
- Sherwani, N., Neral, A., Verma, N., & Gade, N. (2018). Assessment of Level of Knowledge and Practice Of Standard Precautions of Infection Control Among Various Health Care Workers In A Tertiary Care Hospital Of Chhattisgarh. *Indian Journal of Basic and Applied Medical Research*, 7(3), 30–44.