Nurses' performance regarding Infection Control Precautions in Primary Health Care Centers

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Abstract

Background: Standards precautions are designed to protect staff from risks resulting from exposure to blood and body fluids and to protect patients from potential cross infection. Knowledge of clinical infection control practices is continually growing and changing. Therefore, the **aim** of the study was to assess nurses' performance regarding infection control precautions in primary health care centers. **Research design:** a descriptive analytical design had been used. **Subjects:** simple random sample of a total of 379 nurse was recruited from the 1st of June 2019 to the first of December 2019, at selected primary health care centers affiliated to health affairs directorate in Kafr El-Sheikh governorate according to large number of nurses. **Tools of data collection:** three tools were used to collect data: a structured self- administrated nurses' questionnaire, observational check list, and environmental assessment checklist. **Results:** the results revealed that 44.6% of the studied nurses had average level of total knowledge, whereas 58.6% of them had incompetent practice regarding infection control precautions. Moreover, there was highly statistically significant positive linear correlation between total nurse`s knowledge about infection control precautions in primary health care centers and their practice at (r = 0.317, and p =0.000). **In conclusion**, Based on the findings of this study, it can be concluded that, more than one third of nurses in the current study had average overall knowledge score, while more than one half of them had incompetent practice regarding infection control precautions. A highly statistically significant positive linear correlation between total nurses' knowledge about infection control precautions in primary health care centers and their practice was pointed up. **Recommendations:** mandatory regular base educational program must be planned to overcome the weak level of knowledge and updated and the nursing practice regarding infection control standard precautions.

Keywords: Infection Control; Nurses performance; Precautions; Primary Health Care Centers.

Introduction

Primary health Care is essential health care made universally accessible to individuals and families in the community by means acceptable to them, through their full participation and at a cost that the community and country can afford. It forms an integral part both of the country's health system of which it is the nucleus and of the overall social and economic development of the community (**Li Krumholz, Yip, et al., 2020**).

Infections have a serious impact on the quality of patient health care outcomes, and increased morbidity, leading to unnecessary deaths and additional cost (**Alrubaiee, Baharom, Faisal, et al., 2021**).

The advent of COVID-19 has bought the role of infection prevention strategies into focus. The primary means of preventing Health Associated Infections (HAI) is seen as 'the implementation of practices that minimize the risk of transmission of infectious agents'. The best practice in prevention of (HAI) with surveillance; the use of transmission-based precautions; access to personal protective Equipment (PPE); sterilization and cleaning of reusable equipment; environmental cleanliness; and antimicrobial stewardship (**Henderson, Willis, Blackman, Verrall, & McNeill, 2021**).

The universal precaution practice applies the basic principles of infection control through hand washing, utilization of appropriate protective barriers such as gloves, mask, gowns

and eye wear, and safe handling and disposal of sharps, safe handling and disposal of linen, disposal of waste, and disinfection **(El Hakiem, 2020).**

According to the Center for Disease Control and Prevention, standard precautions were defined as "the minimum infection prevention measures that should be applied to all patient care" regardless of their suspicion or confirmation of infection status of the patients, which are used in any setting where health care is delivered. These precautions should be applied at any setting where health-care services are delivered and always assuming that patients' blood, body fluid, secretions, and excrements have infectivity potentials **(Al-Faouri, Okour, Alakour, et al., 2021).**

The professional practice of infection prevention and control has long been a responsibility of health-care facilities, although typically considered in relation to patient protection. Infection prevention and control aims to prevent health-care facility–acquired infections, whether transmitted through inhalation or contact with body fluids or tissue **(Cloete, Yassi, & Ehrlich, 2020).** Nurses are primarily responsible for implementing daily patient care activities in health care facilities and other health institutions that involve more contact with patients than other healthcare workers (HCWs). Consequently, nurses are more exposed to various infections and play a vital role in transmitting it **(Alrubaiee, Baharom, Faisal, et al., 2021).**

Nurses have a critical role in restricting the spread of organisms in two ways: first, as health professionals who spend the most time with patients, nurses have a significant possibility to disseminate organisms. Prior to and after patient contact, as well as after performing a potentially infective action, nurses must cleanse their hands. The second method nurses reduce hand-to-hand dissemination is by working as patient promoters with a large number of social insurance experts **(Mostafa, 2017).**

Significance of study:

Health care acquired infections are worldwide problem. Infection acquired during health care delivery is estimated between 5% and 10% in developed countries on the other hand, in developing countries the risk of infection is 2 to 20 times higher and the proportion of patients infected can exceed 25% as declared by World Health Organization **(Magdy, 2017).**

Covid- 19 infections are increasing in Egypt with 687 new infections reported on average each day, that 39% of the peak and the highest daily average reported in July 2021, 305,269 corona virus cases in Egypt were 17,367 deaths **(WHO, 2021).**

Aim of the study:

This study aimed to assess nurses' performance regarding infection control precautions in primary health care centers.

Research questions

1- What is the nurses' knowledge about infection control precautions in primary health care centers?
2- What is nurses' practice regarding infection control in primary health care centers?
3- Is there a relation between demographic characteristics of studied nurses and total knowledge?
4- Is there a relation between demographic characteristics of studied nurses and total practice?

subjects and methods:

I. Technical design
Research Design:

A descriptive analytical design was used to conduct this study.

Research Settings:

This study was conducted at selected primary health care centers affiliated to health affairs directorate in Kafr El-Sheikh governorate and it was managements and was selected according to the high numbers of nurses in these centers.

Subjects:

A Multistage simple random sample, the estimated sample size was 379 nurses who working at previous mentioned setting, at confidence level 95% by using Steven Thompson equation, Since the total number of nurses was 3000 nurses **(Thompson, 2012)**.

Sampling technique: In this study **multistage sampling** was conducted as following: from total 11 health management (total number of nurses 3000); which affiliated to health affairs directorate in Kafr El-Sheikh governorate , and select 2 health managements which have large number of nurses (number of nurses 921), and select primary health care center and unit which have large number of nurses and select nurses randomly from four medical center, Beiala medical center, Shabas El Shohada rural unit and El Garida Unit).selected setting, (Desook).

Tools of the study:

Tool I: A structured self-administrated nurses' questionnaire:

Part 1:

Demographic characteristics of nurses such as age, gender, marital status, level of education, experiences, workplace, residence and training for infection control program

Part 2:

Nurses' knowledge toward infection control precautions in primary health care centers. It was modified by the researcher after reviewing the literatures based on **Kandeel, (2016).** The questioner consisted of 41 closed ended questions in form of "Yes or No". The total questioner (41 questions) divided into three parts as: Hand hygiene (11 questions). Personal protection tools and respiratory precautions (7 questions), Safe injection and vaccinations against virus B (10 questions), Cleaning, disinfection & sterilization (7 questions) and Health care waste management and textile reprocessing (6 questions).

❖ **Scoring system:**

A scoring system was followed to assess nurses' knowledge toward infection control precautions in primary health care centers. The

Questionnaire was contained of 41 questions, the total scores of the questionnaire were 41 grades, the right answer was scored as a single point and the wrong answer was scored as a zero point. These scores were summed and were converted into a percent score.

It was classified into 2 categories:
- **Good** knowledge if score > 75%.
- **Average** knowledge if score from 60-75%.
- **Poor** knowledge if score < 60%.

Tool II: Observational check list:

It was adapted by the researcher after reviewing the literatures based on **Harder, (2014)** in English and it revised by supervisors. This checklist was used to assess the nurses' performance toward infection control precautions in primary health care centers.

❖ **Scoring system:**

A scoring system was followed to assess nurses' performance toward infection control precautions in primary health care centers; the total checklist was contained of 59 steps divided as: Hand washing technique (18 steps), Personal protective equipment and Respiratory precautions (5 steps), Cleaning, disinfection, and sterilization (17 steps), Safe injection and precautions for handling of medicines (12 steps) Safe disposal of waste and Dealing with textiles (7 steps). Each checklist was assigned a score according to sub-items. The total score of nurses' practices were 59 grades, each item was evaluated as "done" was taken one score and "not done" was taken zero score. These scores were summed up and were converted into a percentage score. It was classified into 2 categories:
- **Competent** if score ≥ 75%.
- **Incompetent** if score < 75%.

Tool III: Environmental assessment checklist:

It was modified by the researcher after reviewing the recent literatures based on **Centers for Disease Control and Prevention, (2014)** to assess the environment infrastructure at previous mentioned setting

❖ **Scoring system:**

The environment assessment was contained of 43 statements, the total score was 43 grades. Each statement was scored as "Yes" was taken one score and "No" was taken zero score. The scores of the items were summed up and were converted into a percentage score.

It was classified into 3 categories:
- **Good** if score ≥ 75%.
  - **Average** if score 60% - 75%
  - **Poor** if score < 60%.

II. Operational Design:
Preparatory Phase:

This phase included reviewing of literature related to nurses' performance toward infection control precautions in primary health care centers. This served to develop the study tools for data collection. During this phase, the researcher also visited the selected places to get acquainted with the personnel and the study settings. Development of the tools was under supervisors' guidance and experts' opinions were considered.

Validity and Reliability

- Validity: It was ascertained by (5) experts professors in specialty of community nursing. Their opinions elicited regarding the format, layout, consistency, accuracy and relevancy of the tools.
- Reliability analysis by measuring of internal consistency of the tool through **Cronbach's Alpha test.**

Pilot Study:

Carried out on 20 nurses those represented 5% of nurses. In order to test the applicability and clarity of the constructed tools. The pilot also served to estimate the time needed for each subject to fill in the questions. According to the results of the pilot, some corrections and omissions of items were performed so the pilot nurses were not included in the main study sample.

Fieldwork:

An approval was obtained from the directors of previous mentioned setting. A letter was issued to them from the faculty of nursing Ain Shams University, explaining the aim of the study in order to obtain their permission and cooperation. Data were collected in four months, from the beginning of June 2019 to the end of December 2019.

The researcher first met with the nurses at the previously mentioned settings, explained the purpose of the study after introducing herself. The researcher was visiting the study setting 2 days/ weekly (Saturday and Tuesday) at morning shift (8a.m-2p.m) and afternoon shift (2pm-8pm) to collect data. The questionnaire for knowledge was filled by nurses which took 15-20 minutes, while the checklist for assessing nurses' practice regarding infection control precaution was filled by the researcher in 50-60 minutes while nurses given daily routine care.

III. Administrative Design:

An official permission to conduct the study obtained from the director of primary health centers. The researcher met the hospital director and explained the purpose and the methods of the data collection.

Ethical considerations:

The research approval was obtained from the Faculty Ethical Committee before starting the study.

The ethical research considerations include the following:
- The researcher was clarified the objectives and aim of the study to nurses included in the study before starting.
- Approval was obtained from the nurses before inclusion in the study; a clear and simple explanation was given according to their level of understanding. They secured that all the gathered data was confidential and used for research purpose only.
- The researcher was assuring maintaining anonymity and confidentiality of subjects' data included in the study
- The subjects were informed that they are allowed to choose to participate or not in the study and they had the right to withdrawal from the study at any time.

IV. Statistical Design:

Data collected from the studied sample was revised, coded and entered using Personal Computer (PC). Computerized data entry and

Statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics in the form of frequencies, percentages. Chi-square test (X^2) was used for comparisons between qualitative variables. Spearman correlation measures the strength and direction of association between three ranked variables.

Significance of the results:
- Highly significant at p-value <0.01.
- -Statistically significant was considered at p-value <0.05.
- Non-significant at p-value>0.05.

Results:

Table (1): revealed that, 41.2% of the studied nurses their age ranged from 30-<40 years. Related to gender, 85.8% of the studied nurses were females. In relation to the educational level of the studied nurses, it was found that, 55.7% of them had Technical Institute of Nursing. Also, 54.1% of the studied nurses were residing in rural areas and 51.5% of working in urban center respectively. Moreover, 50.4% of the studied nurses their years of experience were ≥ 10 year. Also, 63.6% of the nurses under study were not attending training courses related to infection control.

Figure (1): showed that, 44.6% of the studied nurses had average level of total knowledge about infection control precautions in primary health care centers. Also, 26.4% of them had good level of total knowledge. While, 29% of them had poor level of total knowledge.

Table (2): demonstrated that, 62.5% of the studied nurses were competent related to hand washing technique. While, 59.1% of them were incompetent related to use Alcohol-Based Hand rub and personal protective equipment also 55.7% of them were incompetent related to respiratory precautions respectively. Also 54.9% of them were incompetent related to clean, disinfection and sterilization and 76.3% of them were incompetent related to

disinfection of thermometer respectively. Moreover 73.6% of the studied nurses were incompetent related to clean the bloody spillage and safe injection and precautions for handling of medicines respectively. 70.4% of the studied nurses were incompetent related to Safe injection and precautions for handling of medicines. While, 58.3% of the studied nurses were safe disposal of waste and Dealing with textiles respectively.

Table (3): illustrated that, 58.6% of the studied nurses had incompetent practice regarding infection control precautions in primary health centers. While, 41.4% of them had competent practice.

Table (4): demonstrated that, there were highly statistically significant relation between total knowledge of the studied nurses about infection control precautions in primary health care centers and their demographic data such as, educational level, years of experience and attend training courses related to infection control at (P= < 0.01). Also, there were statistically significant relation with their age and work place at (P= < 0.05). While, there were no significant relation with their gender and place of residence at (P= >0.05).

Table (5): showed that, there were highly statistically significant relation between total practice of the studied nurses about infection control precautions in primary health care centers and their demographic data such as, educational level and attend training courses related to infection control at (P= < 0.01). Also, there were statistically significant relation with their age and years of experience at (P= < 0.05). While, there were no significant relation with their gender, place of residence and work place at (P= >0.05).

Table (6): showed that, there was highly significant positive correlation between total nurse`s knowledge about infection control precautions in primary health care centers and their practice.

Table (1): Frequency and percentage of distribution of the studied nurses according to their demographic characteristics (n=379).

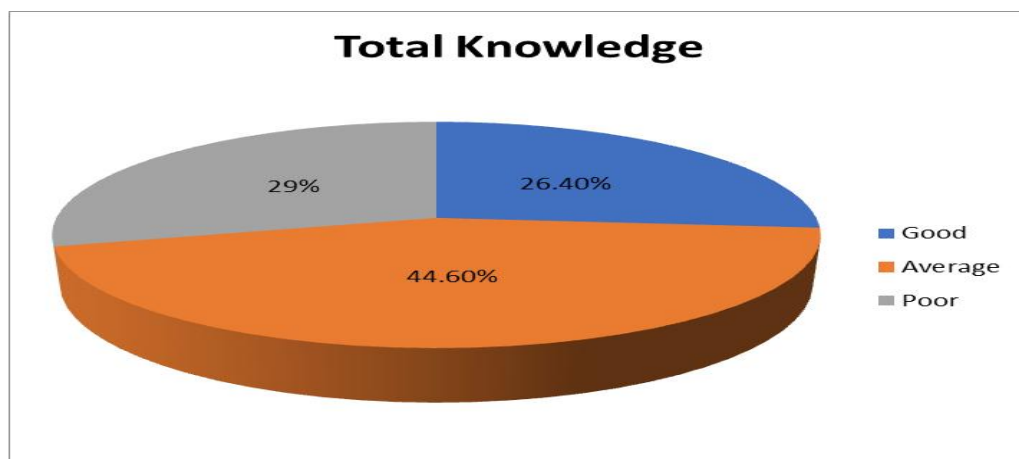| Items	N	%
Age (year)		
20-<30	102	26.9
30-<40	156	41.2
≥ 40	121	31.9
Mean SD 38.94 ± 6.32		
Gender		
Female	325	85.8
Male	54	14.2
Educational level		
Nursing school	118	31.1
Technical Institute of Nursing	211	55.7
Bachelor of Nursing	38	10
Post graduate	12	3.2
Place of residence		
Urban	174	45.9
Rural	205	54.1
Work place		
Urban center	195	51.5
Rural unit	184	48.5
Years of Experience		
<5	88	23.2
5-<10	100	26.4
≥ 10	191	50.4
Mean SD 17.69 ± 1.75		
Training for infection control program		
Yes	138	36.4
No	241	63.6

Figure (1): Frequency and percentage of distribution of the studied nurses according to their total knowledge about infection control precautions in primary health care centers (n=379).

Table (2): Frequency and percentage of distribution of the studied nurses according to their total practice related to infection control precautions in primary health centers (n=379).

Items	Competent		Incompetent	
	N	%	N	%
Hand washing technique	237	62.5	142	37.5
Using Alcohol-Based Hand rub	155	40.9	224	59.1
Personal protective equipment and respiratory precautions	168	44.3	211	55.7
Cleaning, disinfection and sterilization	172	45.4	207	54.9
Disinfection of thermometer	90	23.7	289	76.3
Bloody spillage	100	26.4	279	73.6
Safe injection and precautions for handling of medicines	112	29.6	267	70.4
Safe disposal of waste and Dealing with textiles	221	58.3	158	41.7

Table (3): Frequency and percentage distribution of the studied nurses according to their total practice regarding infection control precautions in primary health centers (n=379).

Total practice	N	%
Competent	157	41.4
Incompetent	222	58.6

Table (4): Relation between demographic characteristics of the studied nurses and their total knowledge about infection control precautions in primary health care centers (n=379).

Items		Total knowledge						X2	P-Value
		Good (n=100)		Average (n=169)		Poor (n=110)			
		N	%	N	%	N	%		
Age (year)	20-<30	60	60	30	17.8	12	10.9	13.69	0.01*
	30-<40	22	22	84	49.7	50	45.5		
	≥ 40	8	8	55	32.5	48	43.6		
Gender	Female	82	82	155	91.7	88	80	6.693	0.138
	Male	18	18	14	8.3	22	20		
Educational level	Nursing school	6	6	26	15.4	86	78.2	25.07	.000**
	Technical Institute of Nursing	46	46	141	83.4	24	21.8		
	Bachelor of Nursing	36	36	2	1.2	0	0.0		
	Post graduate	12	12	0	0.0	0	0.0		
Place of residence	Urban	46	46	80	47.4	48	43.6	7.680	0.094
	Rural	54	54	99	58.6	62	56.4		
Work place	Urban center	74	74	76	45	35	31.8	10.29	0.041*
	Rural unit	26	26	93	55	75	68.2		
Years of Experience	<5	8	8	44	26.1	36	32.7	22.28	.003**
	5-<10	74	74	70	41.4	26	23.7		
	≥ 10	18	18	55	32.5	48	43.6		
Training courses related to infection control	Yes	92	92	44	26.1	2	1.8	26.94	.000**
	No	8	8	125	73.9	108	98.2		

Table (5): Relation between demographic characteristics of the studied nurses and their total practice regarding infection control precautions in primary health care centers (n=379).

Items		Total practice				X2	P-Value
		Competent (n=157)		Incompetent (n=222)			
		N	%	N	%		
Age (year)	20-<30	82	52.2	20	9		
	30-<40	65	41.4	91	41	13.69	0.01*
	≥ 40	10	6.4	111	50		
Gender	Female	133	84.7	192	86.5	5.854	0.201
	Male	24	15.3	30	13.5		
Educational level	Nursing school	18	11.5	100	45		
	Technical Institute of Nursing	93	59.2	118	53.2	24.95	.000**
	Bachelor of Nursing	34	21.7	4	1.8		
	Post graduate	12	7.6	0	0.0		
Place of residence	Urban	84	53.5	90	40.5	8.965	0.081
	Rural	73	46.5	132	59.5		
Work place	Urban center	80	51	115	51.8	8.317	0.088
	Rural unit	77	49	107	48.2		
Years of Experience	<5	18	11.5	70	31.5	15.24	0.01*
	5-<10	24	15.3	76	34.2		
	≥ 10	115	72	76	34.2		
Training courses related to infection control	Yes	130	82.8	8	3.6		
	No	27	17.2	214	96.4	25.98	.000**

Table (6): Correlation between the nurses` knowledge about infection control precautions in primary health care centers and their practice.

Items	Total practice
Total knowledge	r = 0.317
	P = .000**
Total practice	

Statistically significant at p<0.05 highly significant at p<0.01

Discussion:

The results of the current study revealed that majority of the studied nurses were females (table 1). This finding agreed with the study done by **Henderson, Willis, Blackman, Verrall, & McNeill, (2021)** on 500 nurse in Australia to compare the perceptions of nurses with infection control expertise and ward nurses as to what infection control activities are missed and the reasons why these activities were omitted. and found that majority of the studied nurses were females and only one fifth of the study participants were males, on the other hand, a study conducted by **Phan, Maita, Mortiz et al., (2019)** in Chicago, to determine Personal protective equipment doffing practices of healthcare workers (52) it was found that about two third of the study participants were females and nearly one third were males. These study results may be due to that nursing occupation is more common among females more than males and that the numbers of female nurses are more than male nurses.

The result of the current study revealed that around one half of the studied nurses aged between thirty to less than forty years with a mean age 38.94 ± 6.32 table (1). this result nearly agrees with results of a study done by **Akande, (2020)** on 200 nurses (100 each in the intervention and comparison groups) who study the effect of an educational intervention to improve tuberculosis infection control among nurses in Ibadan, south-west Nigeria: a quasi-experimental study and stated that mean age of intervention group was 43.9 years old and the mean age of the study group was 43.6 years old.

These results may be due to increased age of the current study participant could be a risk factor for poor adherence to infection control intervention and precaution due to decreased knowledge about the appropriate practice.

The result of the current study revealed that about two third of the studied nurses were not received training about infection control table (1). This result was contradicted with the study done by **Wong (2021)** to assess the level of compliance with the infection prevention and control practices among HCWs in different healthcare settings and its relationship with their views on workplace infection control measures during the COVID-19 pandemic on 839 nurses in Hong Kong a city in China and reported that the majority of the studied nurses received training about infection control precaution. The results of the current study may be due to the nature of the setting that the study were performed and the presence of a lot of infectious diseases in china city all of this require that all the health care team members to be well trained about infection control procedure and precautions.

The result of the current study showed that one half of the studied nurses had ten years or more of experience table (1). This study result was contradicted with a study done by **Alrubaiee, Baharom, Faisal, et al., (2021)** on 540 nurses in Yemen to evaluate the implementation of an educational module on NIs control measures among Yemeni nurses and found that two third of the studied nurses had nursing experience more than five years. These results may be due to years of nursing experience affect nurses abilities to work and empower them, enhance nurse's practice in all nursing field and specifically in infection control and handling infectious agents and adherence to infection control standard precautions.

Regarding distribution of the studied nurses according to their total knowledge infection control precautions in primary health care centers, the current study showed that that, nearly about half of the studied nurses had average level of total knowledge about infection control precautions in primary health care

centers. Also, about quarter of them had good level of total knowledge. While, more than one quarter of them had poor level of total knowledge. figure (2), This finding is in contrast with the results of the study, which was conducted by **Hassan, Malk, Abdelhamed, & Genedy, (2020)** on 30 nurses to study the effect of an educational program on maternity nurses' knowledge and practices towards infection control in labor units according to standard infection control precautions in Fayoum city, Egypt. It was mentioned that, the most of the studied nurses had good level of total knowledge about infection control precautions post infection control program. Hence it is a must to provide education and training to healthcare staff and it's an important strategy in implementing an infection prevention program. Education has a positive impact on retention of knowledge and practices of staff and has a positive effect on their compliance with infection control practices.

According total practice, the current study detected that more than half of the studied nurses had incompetent practice regarding infection control precautions in primary health centers. While, more than one third of them had competent practice. These results were cohort with the study conducted by **Kerity, & Naji, (2017**) on 70 healthcare workers in Iraq to evaluate the healthcare workers' practices toward infection control measures at primary health care centers in Kerbela city and found most of healthcare workers working in primary health care centers had moderate level of practice regarding infection control. These results explained as only one quarter of studied nurses had good knowledge about infection control precautions in primary health care centers.

The current study revealed that there were highly statistically significant relation between total knowledge of the studied nurses about infection control precautions in primary health care centers and their demographic data such as, educational level, years of experience and attend training courses related to infection control at (P= < 0.01). Also, there were statistically significant relation with their age

and work place at (P= < 0.05). While, there were no significant relation with their gender and place of residence at (P= >0.05). These results explained as nurses attended training program related using illustrative educational method during training program.

These results were consistent with the study conducted by **Geberemariyam, Donka, & Wordofa (2018)** on 680 healthcare workers from 30 randomly selected healthcare facilities in Ethiopia to assess the knowledge and practices of healthcare workers with respect to infection prevention and associated factors in healthcare facilities in southeast Ethiopia and clarified that Healthcare workers were more likely to have infection prevention knowledge if they worked longer ten years or more

In addition, regular with the study performed by **Shrestha, Bhattarai, Thapa, et al., 2017** on 190 health care workers in Nepal to assess the health care workers' knowledge, attitudes and practices on infection control at primary health care and revealed that training program had positive effect on their knowledge level with p value <0.01**.

the current study there were highly statistically significant relation between total practice of the studied nurses about infection control precautions in primary health care centers and their demographic data such as, educational level and attend training courses related to infection control at (P= < 0.01). Also, there were statistically significant relation with their age and years of experience at (P= < 0.05). While, there were no significant relation with their gender, place of residence and work place at (P= >0.05).

These results agree with the study by **Patil, Raval, & Chavan, (2018)** on 138 health care professionals in India to assess knowledge and practices of health care professionals to prevent surgical site infection in a tertiary health care center and reported that work experience and qualification had significant improving their practice level with p value <0.01**. Also, similar with the study by **Desta, Ayenew, Sitotaw, et al., 2018** on 150 in Ethiopia participants to examined the knowledge and

practice of healthcare workers on infection prevention and its associated factors among health professionals working at Debre Markos Referral Hospital and mentioned that older age, lengthy work experience and higher educational status were significantly associated with both practice of infection prevention.

Related to correlation between the nurses` knowledge about infection control precautions in primary health care centers and their practice and environmental assessment, the current results showed that, there was highly significant positive correlation between total nurse`s knowledge about infection control precautions in primary health care centers and their practice. These results supported with the study by **van Rensburg, Engelbrecht, Kigozi, et al., (2018)** on 202 nurses in south Africa to describe the infection prevention knowledge, attitudes, and practices of PHC nurses in a South African district and stated that there was positive correlation between nurses' knowledge and their practice with p value <0.01**.

In addition, regular with the study by **Assefa, Diress, & Adane, (2020)** on 171 nurses in Amhara region, Ethiopia to assess the level of knowledge and practices of healthcare providers towards infection prevention and its associated factors in the health facilities and presented that there was significant correlation between nurses' practice and their knowledge with p value <0.05*.

Conclusion:

Based on the findings of this study, it can be concluded that ,more than one third of nurses in the current study had average overall knowledge score, while more than one half of them had incompetent practice regarding infection control precautions. A highly statistically significant positive linear correlation between total nurses' knowledge about infection control precautions in primary health care centers and their practice was pointed up. In conclusion, nurse managers need to supervise the staff nurses on the practicing infection prevention standards and techniques and monitor nursing adherence to policies of primary health care centers. The Administrators should promote feedback on practice, up dated

knowledge, individual reinforcement, and appropriate rewards for the good practice.

Recommendations:

In the light of the research findings, the following recommendations are offered:
Updating knowledge and practice of nurses through continuing in-service educational training programs should be designed and applied on regular basis.

1. Emphasizing the importance of following latest evidence-based practices of infection control.
2. Providing training programs for newly nurses about infection control and at regular intervals.
3. Follow up; monitoring, and evaluation of the nurses' clinical infection control practice should be done.
4. Hand hygiene and infection control educational posters should be displayed in the unit to increase awareness of nurses.
5. The administrators should promote feedback on practice, individual reinforcement, and appropriate rewards for the good practice.
6. Developing an educational session to be presented to the nursing staff, and other patient care providers interested, would be a next, best step in increasing awareness of the necessity of adhering to infection control precaution guidelines.
7. This education should be offered at various times and days to gain as much participation as possible.
8. Attendance should be incentivized, in ways that would be appropriate to individual units.
9. Further studies are e necessary to currying out on a larger sample and in other setting for findings generalization.

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