The Extent of The Nursing Team Commitment to Infection Control Protocol in Critical Cases Units

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Abstract

Background: severely ill patients have greater risk of acquiring nosocomial infection in intensive care unit. Nurse's compliance with infection control and sterile technique principles can prevent such problem in critical care unit. **Aim**: This study aimed to assess the extent of the nursing team commitment to infection control protocol in critical cases units**. Design**: A descriptive exploratory research. **Setting**: Critical care units at main Assiut university hospital. **Subjects:** A convenience sample of (50) nurses within 3 months. **Tools:** two tools were used**: Tool (I)**: - Nurses' Interviewing questionnaire. **Tool (II):** Nurses Observation checklist. **Results:** 62.0% of the studied nurses had unsatisfactory level of knowledge and 86.0% of them had unsatisfactory level of practice regarding commitment to infection control protocol in critical care unit. **Conclusion**: More than two third of studied nurses had unsatisfactory level of knowledge and majority of them had unsatisfactory level of practice regarding commitment of infection control protocol in critical care units. In addition, there was a significant negative correlation between nurses' Knowledge and practice regarding commitment to infection control protocol in critical care units. **Recommendation** Further research is recommended to evaluate the effect of training program of nurse's performance regarding standard precautions for infection control

Key words: - Commitment, critical care units, Infection control, protocol, Team commitment.

Introduction

The Center of Disease Control and Prevention reported 55 cases and 136 possible cases of HIV transmission to healthcare workers in the US in the year 1985 to 1999 and were mostly nurses and laboratory technicians. Forty-four of the documented transmissions were from hollow-bore needles used for blood collection or intravenous catheter insertion. The average rate of transmission was found to be 0.3% per injury, and it depends on the amount of the patient's blood involved. Exposures from a visibly bloody device, procedures involving venous or arterial access, or deep injury carry greater transmission risk (**Centers for Disease Control and Prevention, 2021).**

Risk factors for HAI including old age; admission as an emergency and to the intensive care unit (ICU); hospital stay longer than seven days; placement of a central venous catheter, indwelling urinary catheter, or an endotracheal tube; undergoing surgery; neutropenia; trauma-induced immunosuppression; a rapidly or ultimately fatal disease; and impaired functional or coma status. (**Watanabe,Caruso, et al., 2020**).

Infections can be divided into localized, disseminated, and systemic disease. A localized infection is limited to a small area. A disseminated infection has spread to areas of the body beyond the initial site of infection. Systemic infections have spread extensively throughout the body, often via the blood. (**Julian, Crook et al., 2020**).

The goals of an Infection Prevention and Control (IPAC) program are to protect clients/patients/residents from HAIs, resulting in improved survival rates, reduced morbidity associated with infections, shorter length of hospital stay and a quicker return to good health; and to prevent the spread of infections from patient-to-patient, from patients to health care providers, from health care providers to patients, from health care providers to health care providers and to visitors and others in the health care environment. (**Linh, Dayana, et al., 2019).**

Prevention and management of infection is the responsibility of all staff working in health and social care, and an integral element of patient safety programmers. Infection prevention should be made a priority in any setting where healthcare is delivered. This includes the availability of appropriate equipment's and supplies necessary for the consistent observation of standard precautions, including hand hygiene products, injection equipment, and personal protective equipment (including gloves, gowns, face and eye protection). (**CDC, 2017**).

Health care personnel especially nurses are at real risk for exposure to patients' blood and body fluid through providing comprehensive and continuous care and consequential at risk of acquiring BBPs. This leads to an increase awareness of the need to protect Health care personnel (HCP) from infection (**Peters, Tartari, et al., 2018**).

Critical care nurses play an important role as the patient's infection control advocate. Nurses in the critical care unite must be well-equipped and demonstrate all knowledge and practice in maintaining a sterile field all times to minimize spread of potential pathogens or self and help patients in having a safe management (**Gonzalo, Silvia et al., 2017**)

Significance of the study:

The ICU-acquired infection is common and often associated with microbiological isolates of resistant organisms. The potential effects on outcome emphasize the importance of specific measures for infection control in critically ill patients (**Tabah et al., 2020**).

This rise prevalence in the last decade has increased the demands for need to establish evidence-based guidelines for control infection in critical care unites during the hospital stay (**Barr et al., 2021**).

However, in Egypt, there is no national statistics available about incidence of infection but according to the researcher's clinical experience it has been observed that nurses are not implementing sterilization techniques

properly to the patients. Nurses are important target population to determine their level of knowledge and practice regarding to infection control in critical care unit (**Said, & El-Shafei, 2021**).

Aim of The Study

This study aims to assess the extent of the nursing team commitment to infection control protocol in critical cases units through:

1.Assess level of nurse's knowledge regarding infection control protocol in critical cases units.

2.Assess level of nurse's commitment to infection control protocol in critical care units.

Research Questions:

1. What is the level of nurse's knowledge in critical cases units as regarding infection control in ICU?

2.What is the level of nurse's commitment regarding protocol of infection control in ICU?

3. Is their relation between the level of nurse's knowledge and their commitment of infection control protocol in ICU?

SUBJECTS AND METHOD

The study was conducted using four designs as follows:

Technical design, Operational design, Administration design and Statistical design.

Technical design:

Research design:

A descriptive exploratory research design was utilized for this study.

Setting:

The study was conducted in ICU at Main Asyut University Hospital affiliated to Asyut University Hospital. **Subjects:**

A convenience sample of all available nurses (50 nurses) , working at the previously mentioned setting.

Tool for data collection:

Data was collected through the following two tools:

Tool I: Nurses' structured Interviewing questionnaire adopted from (Al-Faouri et al., 2021) & (Houghton et al., 2020) & (Donati et al., 2019). It included two parts:

Part 1: Nurses' personal characteristics : It concerned with personal characteristics of the studied nurses involved 5 closed ended questions (age, gender, qualifications level, and years of experience, and infection control training course).

Part 2: Nurses' Knowledge regarding infection control protocol in critical cases units.: this part used to assess nurses' knowledge regarding infection control protocol in critical cases units. It consists of 30 questions in form of multiple-choice and true / false questions which included: definition of the infection, mood of transmission, types of infection, method to prevent spread of infection, Knowledge about sterilization and disinfection

Scoring system:

This part consists of 30 questions, the total score of the questionnaire were 30 grades, the correct answer was scored as one grades and the incorrect answer was scored as zero. the nurses knowledge was categorized into either satisfactory or unsatisfactory level: Satisfactory level of knowledge if scores ≥80% (≥ 24.5) and unsatisfactory level of knowledge if scores <80% (< 24.5)

Tool II: Nurses' Observation checklist commitment to infection control protocol in critical cases units: This part adapted from (WHO2020- CDC2021) and modified by their investigator according the aim of the current study. This part used to assess nurses' commitment to infection control protocol in critical cases units.it consists of 59 procedure which include the following:

Central catheter (6steps), Urinary catheter(4steps), Ventilator (3steps), hand hygiene(7steps), personal protective equipment(5steps), Isolation room(11steps), needle stick prevention and care of laundry (5steps),Injection safety(14steps), Visitor area (4steps).

Scoring system:

This tool consist of 59 procedure, each step was scored by zero if not done correctly or not done and was scored by one if done correctly with total mark 59 grade. The subtotal for nurses practice was categorized into satisfactory or unsatisfactory practice as following :≥80% were considering competent (≥47.2 grade) and <80% were considering incompetent (<47.2 grade).

Operational design:

Preparatory phase:

It included reviewing of related literature, and theoretical knowledge of various aspects of the study using books, articles, internet periodicals and magazines to develop tools for data collection.

Content validity:

Tools of the study were revised by a panel of 7 experts of critical care and Emergency Nursing, Ain shams university (4 professors and 3 assistance professor) to test the clarity, relevance, comprehensiveness, understanding and application . the minor modification were done accordingly .

Reliability:

The developed tools were tested to determine its Reliability using Cranach's Alpha coefficient test which leveled that ; 0.854 for knowledge and 0.825 for practice..

Pilot study:

A pilot study was carried out on 10 % of nurses from the study subjects to test feasibility, simplicity and applicability of the developed study tools, the clarity of included

questions as well as the average time needed to complete tools. The results obtained were studied and analyzed accordingly . No modifications were done for the study tools, the study nurses who shared in the pilot study were included in the study sample .

Field work:

• Data collection were done 3 days /week by the researcher in morning and afternoon shifts . from Sunday to Thursday for 3 months starting from October 2022 to December 2022, it takes 8 hours from (9am to 1 pm and from 3 pm to 7 pm).

• Before starting date collection, a written official permission was obtained from the responsible authorities in the study hospital . this was based on a letter sent from the dean of the faculty of nursing, Ain-sham university, explaining the aim of the study.

• Data were collected after meeting with the nurses included in the study to get their approval to participate in the study and explaining the aim of the study .

• The questionnaire for knowledge administered to each nurses individually to be fulfilled while the checklist were fulfilled by the investigator through observing the nurses during work and the opinion questionnaire were administrated to each nurses individually to be fulfilled .

• The questionnaire for knowledge administered to each nurses took about 15-20 min while the checklist about 30-45 min to fulfilled.

Ethical considerations:

1. Ethical approval was obtained from the scientific, ethical committee of faculty of nursing, Ain Shams University.

2. The purpose of the study was explained to the nurses before conducting the study and oral consent was obtained from them to participate in the study .

3. Nurses were informed that they are allowed choosing to participate or not in the study and they have the right to withdraw from the study at any time.

Administration design:

An official approval letters were issued from faculty of nursing, Ain Shams University to get permission from the director of Asyut University Hospital explaining the purpose of the study to obtain the permission for conducting this study.

Statistical design:

The data were tested for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percent (N, %), where continuous variables described by mean and standard deviation (Mean, SD). Chi-square test and fisher exact test used to compare between categorical variables where compare between continuous variables by t-test \and ANOVA TEST. person Correlation Used to Appear the Association between Nurses' Knowledge related to infection control and Observation checklist commitment related to infection control .

Significance of results was considered as follows:

• Non-significant $p > 0.05$

• Significant $p \leq 0.05$

• Highly Significant $p < 0.05$

Results:

Table (1) Shows that, (62.0%) of the nurses' under study were from (20- <30) year with Mean and SD(29.66±6.73). (74.0%) of them were female . (42.0) of them had technical nursing institute . In addition, (50.0%) of them had From 1-5 years of experience and (94.0%) of them had attended training courses on infection control .

Figure(1):revealed that 38.0% of study sample had satisfactory level of total knowledge level . While 62.0% of studied

nurses had unsatisfactory level of knowledge.

Table (2) illustrates that the maximum score, mean, Standard deviation, range and level of satisfaction of total nurses' commitment regarding infection control in ICU were (59, 37.76± 7.04, 27-59 respectively) with unsatisfactory level of commitment.

Table (3) : shows that, There was no statistically significant relation between total nurses knowledge and their demographic data regarding (age, gender, academic qualification , years of experience, training courses respectively at P=(0.449, 0.171, 0.422, 0.420 &0.162) .

Table (4): Shows that there was no statistically significant relation between nurses'

total commitment level and their demographic data regarding infection control in ICU regarding (age, gender, academic qualification , years of experience, training courses) respectively at P=(0.083, 0.273, 0.148, 0.211, 0.320) respectively.

Table (5): shows that there was no statistically significant difference was found among nurses.

under study (0.052, 0.068, 0.289, 0.180, 0.175, 0.252, 0.080).

Table (6): Correlation, Co-efficient between Nurses' Knowledge and commitment level regarding infection control protocol in ICU (n=50)

Table (1): Number and percentage distribution of the Studied nurses according to their demographic data (n=50)

Demographic data	No	%
Age		
From 20- <30 years	31	62.0
From 30- < 40 years	14	28.0
From 40-≤50 years	5	10.0
Mean ±SD(range)	29.66±6.73(20-50)	
Gender		
Male	13	26.0
Female	37	74.0
Academic Qualification		
Nursing Diploma	13	26.0
Technical nursing institute	21	42.0
Bachelor of Nursing	16	32.0
Years of Experience		
From 1-5 year	25	50.0
From 5 -10 year	12	24.0
From 10-15 year	5	10.0
More than 15 year	8	16.0
Have you ever attended training courses on infection control		
Yes	47	94.0
No	3	6.0

Nurses' Knowledge related to infection control

62.0 Unsatisfactory

38.0 Satisfactory
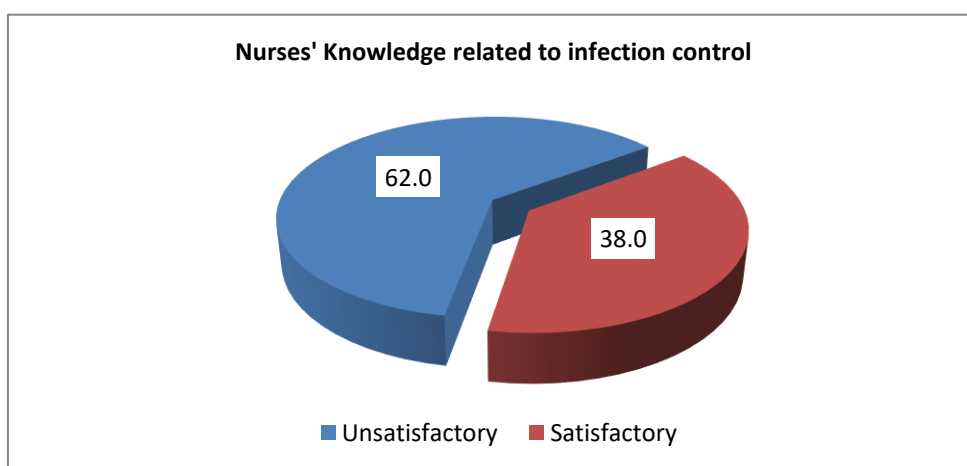
Fig (1) Distribution of Studied nurses according to nurses' Total Knowledge Level related to infection control

Table(2):Descriptive of Studied nurses' according to nurses' observation checklist commitment related to infection Control in ICU (n=50)

	Max Score	Mean ±SD	Range	Mean%	Practice Level satisfaction
Central catheter	6	4.38±1.24	1-6	73.0	Unsatisfactory
Urinary catheter	4	3.78±0.42	3-4	94.5	Satisfactory
Ventilator	3	2.26±0.8	1-3	75.3	Unsatisfactory
hand hygiene provision of supplies	7	5±1.41	2-7	71.4	Unsatisfactory
personal protective equipment provision	5	3.26±1.16	1-5	65.2	Unsatisfactory
Categories of area exterior to contact isolation rooms	6	2.50±1.82	0-6	41.7	Unsatisfactory
Categories of area exterior to airborne infection isolation rooms	5	1.06±1.41	0-5	21.2	Unsatisfactory
Categories Needle stick prevention and care of laundry	5	3.88±0.63	1-5	77.6	Unsatisfactory
medication preparation room Categories	8	5.44±1.67	3-8	68.0	Unsatisfactory
Injection safety: Medication cart Categories	6	5.12±0.85	3-6	85.3	Satisfactory
Visitor area	4	1.08±1.18	0-4	27.0	Unsatisfactory
Observation checklist commitment related to infection control	59	37.76±7.04	27-59	64.0	Unsatisfactory

Table (3):- Relationship between total Knowledge and demographic characteristics of studied nurses' (n=50)

	Nurses' Knowledge related to infection control					
	Unsatisfactory (n=31)		Satisfactory (n=19)		X2	P. value
	No	%	No	%		
Age						
From 20-30 years	21	67.7	10	52.6		
From 30-40 years	8	25.8	6	31.6	1.60	0.449
From 40-50 years	2	6.5	3	15.8		
Gender						
Male	6	19.4	7	36.8	1.87	0.171
Female	25	80.6	12	63.2		
Academic Qualification						
Nursing Diploma	7	22.6	6	31.6		
Technical nursing institute	12	38.7	9	47.4	1.73	0.422
Bachelor of Nursing	12	38.7	4	21.1		
Years of Experience						
From 1-5 year	18	58.1	7	36.8		
From 5 -10 year	6	19.4	6	31.6	2.82	0.420
From 10-15 year	2	6.5	3	15.8		
More than 15 year	5	16.1	3	15.8		
Have you ever attended training courses on infection control						
Yes	28	90.3	19	100.0	1.96	0.162
No	3	9.7	0	0.0		

Table (4):- Relationship between total nurses' commitment level and demographic characteristic of studied nurses' regarding infection control protocol in ICU(n=50)

	Observation checklist commitment related to infection control					
	Unsatisfactory (n=43)		Satisfactory (n=7)		X2	P.value
	No	%	No	%		
Age						
From 20-30 years	24	55.8	7	100.0	4.99	0.083
From 30-40 years	14	32.6	0	0.0		
From 40-50 years	5	11.6	0	0.0		
Gender						
Male	10	23.3	3	42.9	1.20	0.273
Female	33	76.7	4	57.1		
Academic Qualification						
Nursing Diploma	13	30.2	0	0.0	3.83	0.148
Technical nursing institute	16	37.2	5	71.4		
Bachelor of Nursing	14	32.6	2	28.6		
Years of Experience						
From 1-5 year	19	44.2	6	85.7	4.51	0.211
From 5 -10 year	11	25.6	1	14.3		
From 10-15 year	5	11.6	0	0.0		
More than 15 year	8	18.6	0	0.0		
Have you ever attended training courses on infection control						
Yes	41	95.3	6	85.7	0.99	0.320
No	2	4.7	1	14.3		

Table (5):- Comparison between total mean standard deviation of nurses' (knowledge and commitment) regarding infection control protocol and their demographic data(n=50)

	N	Nurses' Knowledge related to infection control		Test Used	Observation checklist commitment related to infection control		Test Used
		Mean ±SD	Range		Mean ±SD	range	
Age							
From 20-30 years	31	21.84±2.71	15-26	F= 3.15 P= 0.052	39.52±7.51	27-59	F= 2.85 P=0.068
From 30-40 years	14	23.79±3.09	18-29		35.36±4.97	28-42	
From 40-50 years	5	24.4±3.78	20-28		33.6±6.19	28-44	
Gender							
Male	13	23.15±4.74	15-29	T= 0.49 P=0.486	36.46±8.29	28-49	T=0.59 P=0.445
Female	37	22.46±2.24	18-26		38.22±6.61	27-59	
Academic Qualification							
Nursing Diploma	13	23.77±2.65	20-28	F= 1.28 P=0.289	35.77±4.87	28-44	F= 1.78 P=0.180
Technical nursing institute	21	22.1±3	15-26		39.9±7.61	27-59	
Bachelor of Nursing	16	22.44±3.35	17-29		36.56±7.38	28-55	
Years of Experience							
From 1-5 year	25	21.6±2.4	15-25	F= 2.14 P=0.108	39.88±6.53	31-55	F= 1.72 P=0.175
From 5 -10 year	12	23.42±4.1	17-29		35.42±9.01	27-59	
From 10-15 year	5	23.8±1.92	21-26		37.4±5.9	30-44	
More than 15 year	8	24±2.98	20-28		34.88±4.29	28-41	
training courses							
Yes	47	22.77±3.06	15-29	T=1.35 P=0.252	37.32±6.72	27-59	T=3.21 P=0.080

(*) Statistically significant at p < 0.05. (**) highly statistically significant at p<0.01

Table (6):Correlation, Co-efficient between Nurses' Knowledge and commitment level regarding infection control protocol in ICU (n=50)

	Mean ±SD	Range	R	P. value
Nurses' Knowledge related to infection control	22.64±3.05	15-29	-0.396-	0.004**
Observation checklist commitment related to infection control	37.76±7.04	27-59		

**Statistically Significant Correlation at P. value <0.01

Discussion

Severely ill patients have a greater risk of acquiring nosocomial infections; this problem is greatest in critical care units. Therefore, healthcare professionals have an obligation to follow scientifically accepted for infection control to prevent disease transmission among patients and healthcare professionals (**Riley, 2019**).

Compliance with infection control and sterile technique principles will be prevent nosocomial infections in the critical care unite, and the patient's hospital stay being shorter and a reduced cost for the medical aids and hospitals (**Zeyada et al., 2021).**

The current study is directed to assess the extent of the nursing team commitment to infection control protocol in critical cases units. Through assessing the level of nurse's knowledge regarding infection control protocol and the level of nurse's commitment in critical cases units.

Regarding the demographic data: The present study revealed that, more than two third of studied nurses were at the age group from 20 to 30 years old. This not in the same line with **Vahedian-Azimi et al., (2019)**, in the study

titled" Effects of stress on critical care nurses: a national cross-sectional study. "who mentioned that; the age group of nurses were ranged from 30-40 years old.

From the researcher point of view this finding might be due to more than two third of the nurses under study were newly graduated. Also, work in ICU require young age staff full of energy and hyperactivity.

Regarding to gender study result show that about three quarters of studied nurses were females and about half of studied nurses were had technical degree, As well, **Abdelatief et al., (2020),** in the study titled " Effect of Nursing Guidelines on Patient Safety Regarding Surgical Positioning at critical " whom revealed that the majority of nurses working in this critical places their ages ranged from 20-40 years, female,

The present study reported that majority of the studied nurses have university education level of nursing and more than half of them their experience was from 1 to 5 years. This result was in congruent with **Sonoda et al., (2018**), in the study titled "Factors related to teamwork performance and stress of operating room nurses " who reported that the majority of nurses who are working in critical units generally had bachelor degree in nursing.

From other hand this study were disagree with **Naqib et al., (2018**) who mentioned that, In the study titled "Quality improvement initiative to improve postoperative pain with a clinical pathway and nursing education program" it may be due to the administrators selected older age nurses to be able to perform mainly tasks in the ICU effectively. As well, **Huston et al., (2019**) stated that, In the study titled " The academic-practice gap: Strategies for an enduring problem" nurses with less years of experience may require maximum additional instruction before they are ready to take a patient assignment, nurses working in one clinical specialty may need amount of instructions to acquire through training program.

Regarding nurses' knowledge to infection control protocol in critical care units: The current study figured out that the total level of nurses' knowledge regarding infection control protocol in ICU were unsatisfactory. This might be related to the lack of knowledge and in availability of policy and guidelines for infection control in critical unites.

In the researcher opinion, this lack of knowledge may be also due to increased work load which may hinder nurses' ability to read and update their knowledge. Thus, there was a need to strengthen what nurses know and provide them with the needed knowledge necessary to improve their practice which improves quality of care.

The present study was in the line with the study conducted by **Lin et al., (2019),** in the study titled "Preventing surgical site infections: Facilitators and barriers to nurses' adherence to clinical practice guidelines—A qualitative study" which identified that staff nurses had knowledge deficit regarding infection in ICUs and nurses needed to receive nursing guidelines in this area.

Regarding nurses' commitment to infection control protocol in ICU: The current study demonstrated that, there is unsatisfactory commitment level regarding infection control protocol in ICU. This finding was in accordance with **Hassan et al., (2020**), in the study titled " Infection control knowledge and practices: Program management in labor units according to standard infection control precautions in Northern Upper Egypt" who reported that there was adequate performance level regarding infection control precautions.

This finding disagrees with **Mahrous et al., (2022**), in the study titled " Effect of Mind Map Using on Improving Nurses' Performance Regarding Infection Control at Surgical Departments" who demonstrated that less than half of physicians and less than quarters of nurses had adequate level of performance, while none of the workers had satisfactory level of practice.

Regarding relationship between the total nurses' knowledge and practice scores and their demographic characteristics: The contemporaneous study found that there was no

statistically significant difference found between nurses' knowledge and their level of demographic data. This result was not in agreement with **Dhakal et al., (2016),** in the study titled " Nurses' knowledge and practice of aseptic technique in the operation theatre at selected Hospitals of Bharatpur" who found that the highest mean knowledge scores among younger with low experience nurses those who have the least experience.

This result not agreed with **Fashafsheh et al., (2015),** in the study titled "Knowledge and Practice of Nursing Staff towards Infection Control Measures in the Palestinian Hospitals. Journal of Education and Practice " who showed in his study that bachelor register nurse were significantly better patient outcomes, that not in it line with the present study results. The educational level, and years of experience of studied nurses could be factors affecting on level of nurse's knowledge.

Regarding the relation between nurses' knowledge and their practice level: The current study demonstrated that there was a negative correlation between nurses' knowledge and their practice. **Harley et al., (2019**), in the study titled "Emergency nurses' knowledge and understanding of their role in recognizing and responding to patients with sepsis: A qualitative study" who reported same results regarding correlation between knowledge and practice, there was negative correlation between emergency nurses' knowledge and practice. As well, **Jemal et al., (2021**), in the study titled "Knowledge, attitude, and practice of healthcare workers toward COVID-19 and its prevention in Ethiopia" who found that there was no correlation between knowledge and practice.

This opposite with **Napolitano et al., (2019**), in the study titled " Healthcare workers' knowledge, beliefs, and coverage regarding vaccinations in critical care units in Italy" who stated that a highly statistical significant correlation between participants' scores of knowledge and practice regarding infection control in critical unites.

From researcher point of view may be due to the suitable intervention packages need to be developed and in service education need to be given periodically for the effectiveness of qualitative nursing services

Conclusion

Based on the results of the current study, it can be concluded that:

More than two third of studied nurses had unsatisfactory level of knowledge, majority of them had incompetent level of practice regarding commitment of infection control protocol in critical care units. In addition, there was a significant negative correlation between nurses' Knowledge and practice regarding commitment to infection control protocol in critical care unit.

Recommendations

Based on the results of this study the following recommendation was suggested:

• Continuous evaluation of nurse's knowledge and practice to identify nurses educational needs regarding infection control protocol

• Availability and accessibility of written infection control guidelines in intensive care unit.

• Continuing in service education for nurses based on the evidence based practices for application of for infection control protocol in critical care units

• Providing orientation programs for newly joined ICU nurses about infection control protocol.

• Further research is recommended to evaluate the effect of training program of nurse's performance regarding infection control protocol.

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