

Nurses' Performance Regarding Nosocomial Infection Control Guidelines at Burn Unit

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Abstract

Background: The nosocomial infections is major concern at the burn unit with a significant economic impact worldwide. Aim: to assess nurses' performance regarding nosocomial infection control guidelines at burn unit. **Subjects and Method:** A Quasi-experimental research design was used in this study on a convenience sample of nurses' work at the burn units were providing care at burn unit with different qualifications were included in the study with total number of (82) nurses from both sexes with diverse ages, years of experience, and different level of education, affiliated to Mansoura university hospitals. **Tools:** Three tools were utilized: tool I: structured assessment questionnaire to assess the nurses, demographic characteristics and knowledge about nosocomial infection control, tool II: Nurses practice observational checklist, in addition to tool III: Nurses' attitude scale toward infection control guidelines. **Results:** study result Showed statistically significant improve in attitude, practices and knowledge level of study participated nurses with p value (0.001) *. **Conclusion:** The study concluded that there was a positive effect of guidelines applying on improving of attitude, practices and knowledge level of studied nurses. **Recommendation:** Providing continuous education and update for nurses regarding guidelines of nursing practices about infection control at burn unit, develop periodic workshops on online modules to reinforce infection control guidelines, encourage further research to evaluate the long term effectiveness guidelines and gather feedback from nurses to improve training programs, incorporate the infection control guidelines into hospital policies and ensure compliance through standard operating procedures and regular audits, foster teamwork and collaboration between nurses and other healthcare staff to enhance overall performance in infection control and burn care.

keywords: Attitude, Guidelines, Nosocomial infection, Nurses knowledge, Practice

1. Introduction

National Nosocomial Infections Surveillance (NNIS) System in the United States tracks the incidence and types of

nosocomial infections in critical care units such as burn unit and has identified a number of common pathogens and high-risk areas for infection, including central line-associated bloodstream infections, ventilator associated

pneumonia, surgical wound site and catheter-associated urinary tract infections (**Zabihi et al., 2024**).

The risk of nosocomial infections can be raised by a number of internal and external causes.

. Intrinsic factors are those that inherent in the patient due to underlying health conditions, while extrinsic factors are those that related to the hospital environment or medical procedures. The use of intrusive gadgets and high-risk medical procedures like surgery are frequently mentioned as important extrinsic factors that contribute to nosocomial infections.

While intrinsic factors such as age, respiratory and cardiac conditions, immunocompromised and patient congenital disease, burned surface area, and the number of comorbidities, were significantly associated with nosocomial infections (**Cui et al., 2024**).

In burn unit, nosocomial infections are caused primarily by *Escherichia coli*, *Enterococcus*, *Pseudomonas aeruginosa*, and *Candida* in addition to fungal infections. Risk factors for nosocomial infections in burn include the use of invasive devices such as vascular catheters and endotracheal tubes, decubitus ulcers and surgical debridement (**Mateescu et al., 2023**). Nosocomial infection affecting approximately 2million people each

year and requiring hospitalization for 5% to 15% of those affected. Nosocomial infections annual direct costs in Europe due to healthcare-associated infections is estimated at approximately EUR 7 billion, including 16 million extra days of hospital stay (**CDC,2024**).

Currently, seven patients in high-income nations and fifteen patients in low- and middle-income countries will receive at least one health care-associated condition for every 100 patients in acute-care hospitals. infection (HAI) during their hospital stay (**WHO, 2024**).

Additionally, 52.3% of patients treated in a critical care unit and more than 24% of patients with infections linked to healthcare facilities may away annually.

Deaths are increased two to threefold when infections are resistant to antimicrobials, as nosocomial infections are a serious problem in hospitals, particularly in burned patients (**Rossi et al., 2024**).. In Egypt the incidence of HAI was 3.7% as well the highest incidence was in the burns unit 48.1% followed by General Intensive Care Unit 20.9% and Neurosurgical ICU 18.9%. In a study implemented at Egypt in Mansoura governorate a tertiary care hospital by **Hassan et al. (2020)**.

It is the responsibility of all healthcare providers, both individuals and organizations,

to prevent nosocomial infections.

Everyone must work cooperatively to reduce the risk of infection for patients and staff. This includes personnel providing direct patient care, management, physical plant, provision of materials and products, and training of health workers. Infection control programs are comprehensive and include surveillance and prevention activities, as well as staff training. There must also be effective support at the national and regional levels (Saber *et al.*, 2024).

Guidelines are defined as set rules or instruction that show something how should be done and there are different types of guideline from which , health guideline that provides information on how to maintain good health as infection control guidelines and recommendations for healthcare settings to implement these guidelines the nurse should have the needed knowledge, skills, and positive attitude toward burn, burned patient management, and infection control guidelines (Marey *et al.*, 2020).

Nosocomial infections can have significant negative consequences, including extra hospitalization days, additional costs, and even deaths, depending on the site of infection. These consequences and associated costs can

be substantial, and it is important to identify patients at highest risk for infection in order to prioritize prevention and control efforts, this can help to track the trends of infections (Qattan *et al.*, 2024).

1.2. Significance of the study:

The effectiveness of nosocomial infection control in a patient's burn depends on the environment and wound being managed septicallly, as well as nurses' understanding and application of infection control and burn management protocols, the nurses who care for burn patients can reduce the number of septic episodes as well as the morbidity and mortality associated with sepsis in the burned patient (Berrio *et al.*, 2024).

Nosocomial infections can result in notable adverse effects, such as prolonged hospital stays, increased expenses, and potential fatalities, which vary based on the location of the infection .

These consequences and associated costs can be substantial, and it is important to identify patients at highest risk for infection in order to prioritize prevention and control efforts, this can help to track the trends of infections (Hemmati, *et al.*, 2023).

e aim of the study: This study aimed to assess nurses' performance regarding (WHO) nosocomial infection control guidelines at burn unit.

Objectives of the study:

1. Assess nurses' level of knowledge regarding Nosocomial Infection Control Guidelines at Burn Unit
2. Assess nurses' level of practice regarding nosocomial infection control guidelines at burn unit.
3. Assess nurses' attitude regarding nosocomial infection control guidelines at burn unit.
4. Determine the relationship between nurses' knowledge, practice and attitude towards nosocomial infection control guidelines at burn unit.

Research questions:

1. What is the nurses' level of knowledge regarding nosocomial infection control guidelines at burn unit?
2. What is the nurses' level of practice regarding nosocomial infection control guidelines at burn unit?
3. What is the nurses' attitude towards nosocomial infection control guidelines at burn unit?
4. Is there a relationship between nurses' knowledge, practice, and attitude towards

nosocomial infection control guidelines at burn unit?

2. Subjects and Methods

Technical Design: The technical design included study design, setting, subject and tools of data collection.

I. Research design

A Quasi-experimental research design was used in this study as the random choice of the sample have been lost due to reduced number of available populations of the study.

II. Research Setting

This research was conducted at the Plastic, Reconstructive, and Burn Surgery Center of Mansoura University

The building contains five floors to care for burn patients; the ground floor contains of head nurse's office, archives office, and the gas distribution room. The first floor has a sterilization room, two rooms for changing clothes for male and female nurses and room for cases of late burns who suffering from infections and bed sores. The second floor contains ICU for burn; the third floor contains operations for surgeries and ICU of plastic surgery. The fourth floor contains the pharmacy and the doctors' offices, and the fifth floor contains the laboratory for investigations and

cases of aplastic surgeries.

Participants:

Convenience sample of all available nurses were providing care at burn unit with different qualifications were included in the study with total number of (82) nurses from both sexes with diverse ages, years of experience, and different level of education.

Tools of data collection:

In the present study it consists of three tools as follow:

Tool I: Structured questionnaire: Adopted from (*Abdelkhalek, 2020*) to assess nurses' demographic and knowledge regarding nosocomial infection control. This tool consisted of two parts:

Part 1: Demographic characteristics.

It comprises nurses' profile characteristics like: age, gender, marital status, and educational level, number of experience years and attending of infection control courses. The six items of this part had closed ended answer.

Part 2: Nurses' knowledge about nosocomial infection control questionnaire at burn unit.

It is a self-administered questionnaire.

Adopted from (*Abdelkhalek, 2020*) This part consisted of 100 close ended items used to assess nurse's knowledge regarding infection control measures. This part needed 25 -40 minutes to be filled and included eight sections as the following:

Section I: Nurses' knowledge about burn injury. This part included ten items about degree, causes, types of burn, estimating the area and management of the burn

Section II: Nurses' knowledge about nosocomial infection. This part included 20 items about chain of infection, method of transmission, incidence, communicable period, hospital acquired infection and immunity.

Section III: Nurses' knowledge about infection control measures with 32 items in total, include three categories: standard precautions (six items), hand washing (ten items), personal protective equipment divided to gloves (eight items), plastic apron (two items), overhead (one item), masks (three items), and overshoes (two items).

Section IV: Nurses' knowledge about infection control measure for burned patients include: **14 items** in total with inclusion of three categories: nursing care for burn wound dressing (five items), nursing care for injection and the installation of solutions (five items), nursing care for urinary catheter (four items).

Section V: Nurses' knowledge about waste

management that includes six items about contaminated body fluids and sharp instrument management.

Section VI: Nurses' knowledge about linen management that includes five items about contaminated mattresses, pillows, soiled linens and blankets management.

Section VII :Nurses' knowledge about sterilization and disinfection that include nine items about medical instruments and wound dressing.

Section VIII: Nurses' knowledge about burned patients visiting policy that includes four items about children associating and plants carrying.

Scoring system

Each correct answer was given one score, while incorrect answer given zero, with total score of 100. Then it was transferred in to percentage. The level knowledge categorized as high if nurses `total knowledge is ranged between (85%-100%), moderate if ranged between (60%-84%) and low if less than 60% (0%-59%) (*Abdelkhalek, 2020*).

Tool II: Nurses' practices observational checklists.

It was adopted from the WHO guidelines (updated in 2023) and (*Abdelkhalek, 2020*) for nosocomial infection control that with inclusion of eight sections as the following:

Section I: Hand washing technique that included (22 items).

Section II: Hand scrubbing before burn wound dressing that included (21 items).

Section III: Donning and removing sterile gloves technique which included (17 items).

Section IV: Burn wound dressing that included (21 items).

Section V: Vein puncture/insertion of peripheral IV line technique that included (24 items).

Section VI: Urinary catheter insertion care that included (seven items).

Section VII: Proper use of personal protective equipment that included 36 categories in total and included four categories: Gloves (14 items), aprons and gowns (five items), overhead (two items), face Masks (seven items), sequence for putting on PPE (four items), sequence for removing Personal Protective Equipment. (Four items).

Scoring system

Each item in the checklist has three Likert options that include correctly done scored (2), incorrectly done that scored (1) and not done that scored (0). Observing practices for proper use of PPE scored yes with score of "1" and no with score of "0"

When practice scored > 296 it means that the patient has level of practice more than $\geq 85\%$ so it was classified as good performance level, while practices scored (250-177) it was ranged between 60%: 84%, it was classified as **Fair**, and if practice scored (0- 177) $< 60\%$, it was classified as **poor** (*Abdelkhalek, 2020*).

Tool III: Nurses 'Attitude Scale

This tool adopted from (*Al-Ahmari et al., 2021*) included nurse's attitude toward infection control in burn unit and nurses' behavior when dealing with instruments during work. It consisted of 25 items The tool needed to 10 minutes to be completed.

Scoring for Nurses' Attitude scale:

The scale was measured on three points Likert scales ranging from, agree, neutral, disagree. Responses scored as (2) agree, (1) neutral and (0) disagree. Score of items was summed up with total score divided by number of items giving mean score for the attitude. Then total score was converted into a percentage, and means and standard deviations were computed. The attitude was considered "Positive" if percent score 60 % or more and "Negative" if less than 60 (*Al-Ahmari et al., 2021*). **Administrative**

design:

Two Faculty approvals were obtained; one to meet the nurses at Plastic, Reconstructive and Burn Surgery Center and the second to permit to the researcher to meet the nurses; this was post clarifying the importance of the research.

II: Operational Design: It included validity, reliability, pilot study and field work.

Validity:

The face and content validity were established through five expertise's from medical surgical nursing who reviewed the tools for clarity, relevance, comprehensiveness, understanding, applicability and simplicity for implementation and according to their opinions some modifications was applied accordingly such as scoring system.

Validity of Translation (Back translation):

Tools were translated into Arabic language by an expertise translator. Then it was translated in to English language to ensure the validity of translated versions of the tools.

Reliability:

Reliability testing was done using Cronbach's alpha to estimate its internal consistency to appraise how well the tool consistency estimate what they aimed to

measure. This technique showed high reliability of the final version of tools. Its maximum value is 1.0, which indicated highest reliability. For this study the correlation coefficient was: $(r)=0.88$ for nurses' infection control questionnaire of burned patients, $(r) = 0.89$ for nurses' performance observational checklists, $(r) =0.88$ for hospital environment observational checklist.

Pilot study

A pilot study was carried out on 10 % of total number of nurses (8 nurses) to evaluate clarity, ambiguity, applicability, objectivity, relevance and feasibility of tools used for data collection as well as to identify any problems associated with administration of the questionnaires and to measure the time needed for data collection with each nurse.

Modifications were done accordingly. Nurses who shared in the pilot study excluded from the study sample.

Work field

The study was implemented through the following four phases, and was conducted over a period of 9 months which started from September 2022 to May 2023.

phase1: Assessment phase

The researcher started this phase by introducing herself to the studied nurses and

explaining the purpose of the study, then an oral consent from each nurse participated in the study was obtained. The knowledge of each nurse was assessed individually using tool II, and the average time to fill it was estimated about 25 to 40 minutes. This was followed by observing nurses' practices and fill the practice checklist of the studied nurses, these pre-tests were done before developing (WHO) guidelines to assess level of nurses' knowledge, practice, and attitude by using tool I, II and III. Nurses were observed indirectly during morning and afternoon shifts.

Ethical consideration

Written and oral consent was obtained from each participating nurse prior to her \ his inclusion into the study after clarification of the nature and aims of the study, get approval from the Ethics Committee of nursing faculty Suez Canal University No (123/9/2021), Confidentiality of the collected data was maintained, and the Participants were informed that they have the right to withdraw from the study at any time.

Statistical Design

I - Software Used:

IBM-SPSS software (IBM Corp) was used to input and analyze the data .

. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.).

II- Data Expression:

Qualitative data was presented as both the total number [N] and percentage. [%]. Quantitative data were initially tested for normality using Shapiro-Wilk's test with data being normally distributed if $p > 0.050$. Examination for the existence of anomalies Boxplots were used to examine extreme values.

Quantitative data were reported as mean \pm SD in the presence of normal distribution and no significant outliers, or as median and IQR if not normally distributed.

III -Data Comparison:

Qualitative Data:

Chi-Square test (or Fisher's exact test) was employed. The Z-test was utilized alongside the Bonferroni approach for adjusting p-values .during the comparison of column proportions

The chi-square goodness-of-fit test was run to compare sample distribution with a hypothesized or known distribution. This hypothesized or known distribution consists of the proportion of cases expected in each

category of the multinomial variable.

Quantitative data (pretest-posttest):

Paired-Samples t-test was used for normally distributed data and the non-parametric alternative; Wilcoxon's signed Ranks test was used if not.

Correlation Tests:

1. Spearman's correlation (Coefficient = r_{est}):

This test was used to assess the strength and direction of association between quantitative variables or ordinal variable

2. Point Bacterial correlation (coefficient = r_{ob}):

This test was used to assess the strength of association between a dichotomous variable with a quantitative variable.

3. The eta coefficient (coefficient = η):

This test was used to assess the strength of association between a multinomial variable with a quantitative variable.

Significance level:

Results from tests were deemed .statistically significant if p value was ≤ 0.050

Charts:

Appropriate charts were used to graphically present the results whenever needed including Pie chart, and Bar chart.

3. Results:

The following order is used to present the current study's findings:

Table (1) Revealed that most studied nurses were females (81.7 %), and (47.5%) of studied nurses aged from 30>40 years with Mean \pm SD 20.5 \pm 14.8. Concerning marital status, the largest percentage of studied nurses were married (57.4%). In reference to educational level, (80.5%) of the studied nurses had technical health institute education. The study also showed that (51.3%) of nurses had experience from 5 to 10 years. Moreover; (62.1 %) attended training courses about infection control and reported that it one to two times only.

Fig (1) Illustrated that total level of knowledge of studied nurses about nosocomial infection registered in high level within (17.2%) of the infection control guidelines.

Table (1): Demonstrated the relation between nurses' demographic characteristics and their total knowledge of the guidelines; there were no statistically significant relations between nurses' gender, age, marital status, educational level, years of experiences, attendance of training courses and their total knowledge with the highest level of knowledge was among nurses get technical health institute education by (90.9%).

Fig (2) Presented that the total level of practice of studied nurses about nosocomial infection was good in (15.8%) of the studied nurses; respectively.

Fig (3) Illustrated that attitude of nurses studied showed significant relation. Negative attitude at the pre-intervention was agree (18.2%) in the studied nurses.

Table (2): Demonstrated the relation between nurses' demographic characteristics and their total knowledge level of the infection control guidelines. It was found that, pre implementation of the guidelines; there were no statistical significant relations between nurses' gender, age, marital status, educational level, years of experiences, attendance of training courses and their total knowledge with the highest level of knowledge was among nurses get technical health institute education by (78.8%)

Table (3): Demonstrated the relation between nurses' demographic characteristics and their total practice level of the infection control guidelines. It was found that, pre implementation of the guidelines; there were no statistically significant relations between nurses' gender, age, marital status, educational level, years of experiences, attendance of training courses and their total practices.

Table (4) Demonstrated the relation between nurses' -demographic characteristics and their total attitude of the guidelines. It was found that; there were no statistically significant relations between nurses' gender, age, marital status, educational level, years of experiences, attendance of training courses and their total practice.

Table (5) Illustrated the correlation between nurse's level of knowledge and their practices and attitude It was found that there was no statistically significant correlation between nurses' knowledge and their practices. Also, the table showed no statistically significant correlation between nurses' knowledge and their attitude. And there was highly statistically significant correlation between nurses' knowledge and their attitude.

4. Discussion:

Nosocomial infections, pose a significant threat to patient safety and well-being within healthcare settings. Among the specialized units where the risk is particularly pronounced is the burn unit, as patients with severe burns require intensive care and meticulous attention to prevent secondary infections (*Raofi et al., 2023*).

Demographic characteristics of studied nurses in the current study reported that,

females were the most abundant gender in this study as in the past it was the profession of females and men has added to it recently. Regarding age group; this study reported that the highest percentage which around half of nurses are between 30 > 40 years of age, this result might be because the younger nurses provided the caring practice, while the older ones played the roles of supervision and management. More than half of nurses were married in the present study.

Referring to the studied nurses' qualification; more than three - quarters of the studied nurses having a technical nursing institute. Regarding years of experience of the studied nurses; the findings of the current study showed that around half of the studied nurses had experience ranged between 5-10 years. In relation to attending training courses; the present study showed that around two-thirds of the studied nurses attended training courses. This result agreed with (*Mohammed et al., 2021*).

Regarding the line that is opposite (*Mukhlif et al., 2021*) Low levels of nosocomial infection control recommendations regarding burn injury were found in the current investigation regarding nurses' awareness of burn injury. This could be explained by the fact that nurses are required to take ongoing

education classes in order to retain the material.

This finding was in accordance with *(Buksh et al., 2019)* who reported that baccalaureate prepared nurses had a positive impact on knowledge. Also, *Rahman et al. (2017)* suggested that the relationship between nurse education and knowledge is needed to identify the optimal mix of nurse education and skills for different situations. In the investigator opinion the high level in education lead to improvement of knowledge.

This study represented statistical significance relation between total practice level and level of education with the highest level was among bachelor degree nurses. This finding was in accordance with *(Mohammed et al., 2021)* who reported that baccalaureate prepared nurses had a positive impact on nurses` performance and level of education.

Referring to attitude of the studied nurses in this study, there was a statistically significant difference among all the study phases indicates improvement in all aspects of studied domains, there was a statistical significant relation between nurses' educational level and their total attitude as the highest percentage was among nurses who get technical health institute education, which may be contributed to effective educational and training sessions. For

instance, a study by *Vincent et al., (2021)* who conducted a study on Knowledge, attitudes and practices of nurses regarding infection prevention and control in imo state university teaching hospital and found a significant improvement in nurses' performance and attitude toward nosocomial infection prevention. It concluded that evidence-based guidelines are effective in enhancing nurses' performance and attitude, and that regular training and supervision are needed to sustain the improvement.

This study revealed that there was a significant strong positive correlation between nurses' knowledge and practice after applying the intervention program. This was in agreement with *Abalkhail et al. (2021)* at Saudi Arabia that aimed to evaluate Knowledge, attitude and practice of standard infection control precautions among health-care workers and findings of this results there was significant relationship between nurses' practices, attitude and knowledge. Moreover, *(Vincent et al., 2021)* reported a statistically significant relation between nurse's attitude and their qualifications and experiences in burn department, and training on burn care. There is no statistically significant relationship between the knowledge of nurses and their age and gender .

Which implies that other factors, such as

organizational culture, managerial support, ethical training, and professional image, may influence nurses' attitudes and motivation more than their practices.

The investigator sees that the continuous evaluation process in assessing the success rate of training program in each study including knowledge, practice, environment and attitude, help in maintenance of good nursing performance.

5. Conclusion

The results of the current study concluded that total level of knowledge of studied nurses about nosocomial infection registered in high level within (17.2%) of the infection control guidelines and total level of practice of studied nurses about nosocomial infection was good in (15.8%) of the studied nurses.

Total level of attitude of studied nurses showed that agree with (18.2%), neutral

(12.3%) and disagree with (69.5%) in the studied nurses.

6. Recommendations:

-Providing continuous education and update for nurses regarding guidelines of nursing practices about infection control at burn unit, -Develop periodic workshops on online modules to reinforce infection control guidelines, encourage further research to evaluate the long term effectiveness guidelines and gather feedback from nurses to improve training programs.

- Incorporate the infection control guidelines into hospital policies and ensure compliance through standard operating procedures and regular audits.

-Foster teamwork and collaboration between nurses and other healthcare staff to enhance overall performance in infection control and burn care.

Result

Table (1): Demographic Characteristics' Frequency Distribution of Studied Nurses (N=82)

Characteristic	No	%
Age of nurse		
20 >30	17	20.7%
30 >40	39	47.5%

40 >50	21	25.7%
50 >60	5	6.1%
Mean ± SD	20.5 ± 14.8	
Gender		
Female	67	81.7%
Male	15	18.3%
Marital status		
Single	23	28%
Married	47	57.4%
Divorced	9	10.9%
Widow	3	3.7%
Educational level		
Bachelor	11	13.4%
Technical health institute	66	80.5%
Nursing school	5	6.1%
Years of experience		
<5	13	15.8%
5 > 10	42	51.3%
≥ 10	27	32.9%
Attending training courses about infection control		
Yes	51	62.1%
No	31	37.8%

Figure (1): Total Percentage Distribution Level of Knowledge of Studied Nurses about Nosocomial Infection (N=82)

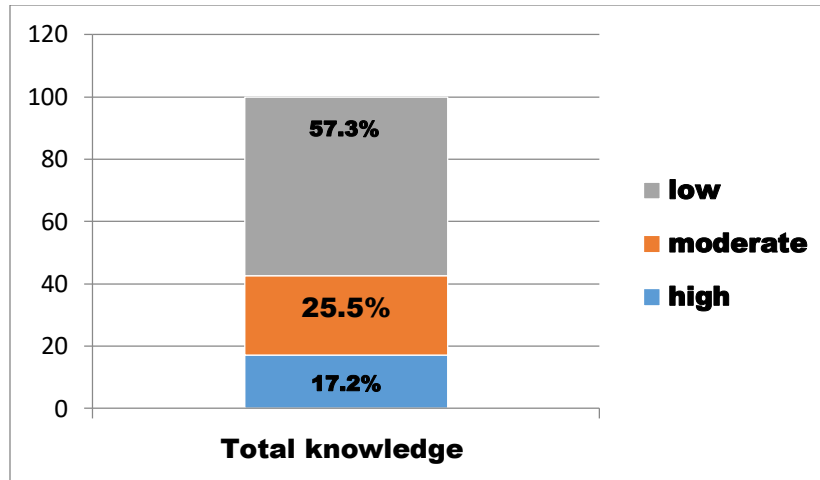


Table (2) shows the correlation between nurses' demographic characteristics and their knowledge.

	Knowledge						MCP
	High (N =14)		Moderate (N = 21)		Low (N = 47)		
<u>Gender</u>	N	%	N	%	N	%	
Female	11	78.5	9	42.8	47	100	0.080
Male	3	21.5	12	57.2	0	0.0	
<u>Age</u>							
20 >30	3	21.4	2	9.6	12	25.5	
30 >40	0.0	0.0	10	47.6	29	61.8	
40 >50	8	57.1	9	42.8	4	8.5	0.203
50 >60	3	21.5	0.0	0.0	2	4.2	
<u>Marital status</u>							
Single	4	28.5	6	28.5	13	27.6	
Married	9	64.4	12	57.3	26	55.5	

Divorced	1	7.1	2	9.5	6	12.7	0.345
Widow	0	0.0	1	4.7	2	4.2	
<u>Educational level</u>							
Bachelor	2	14.2	2	9.5	7	14.8	
Technical health institute	11	78.5	19	90.4	36	76.5	0.099
Nursing school	1	7.1	0.0	0.0	4	8.5	
<u>Years of experience</u>							
<5	1	7.1	6	28.5	6	12.7	
5 > 10	11	78.7	14	66.8	17	36.1	0.210
≥ 10	2	14.2	1	4.7	24	51.2	
<u>Attending courses</u>							
Yes	3	21.4	10	47.6	38	80.8	0.390
No	11	78.5	11	52.3	9	19.1	

MCP: P value based on Monte Carlo exact probability

P value is significant if ≤ 0.05

Table (3):

Relation between nurses' demographic characteristics and their total practice

Practice	Good (N =13)		Fair (N = 21)		Poor (N = 48)		MCP
	N	%	N	%	N	%	
Gender							
Female		11	84.6	16	76.2	40	83.4
Male	2	15.4	5	23.8	8	16.6	0.122
<u>Age</u>							
20 >30	3	23.0	2	9.5	12	25.0	
30 >40	4	30.8	0.0	0.0	35	72.9	

40 >50	5	38.6	16	76.3	0.0	0.0	0.226
50 >60	1	7.6	3	14.2	1	2.1	
<u>Marital stats</u>							
Single	5	38.6	4	19.2	14	29.1	
Married	8	61.4	9	42.8	30	62.7	0.185
Divorced	0.0	0.0	6	28.5	3	6.2	
Wide	0	0.0	2	9.5	1	2.0	
<u>Educate level</u>							
Bach lore	7	53.8	2	9.5	2	4.1	
Technical health institute	6	46.2	17	81.0	43	89.7	0.75
Nursing school	0.0	0.0	2	9.5	3	6.2	
<u>Years of experience</u>							
<5	6	46.2	0.0	0.0	7	14.5	
5 > 10	4	30.8	21	100.0	17	35.5	0.311
≥ 10	3	23.0	0.0	0.0	24	50.0	
<u>Attending causes</u>							
Yes	9	69.0	8	38.0	34	70.8	
No	4	31.0	13	62.0	14	29.2	0.090

Figure (3) Attitude distribution toward nosocomial infection of studied nurses (N=82)

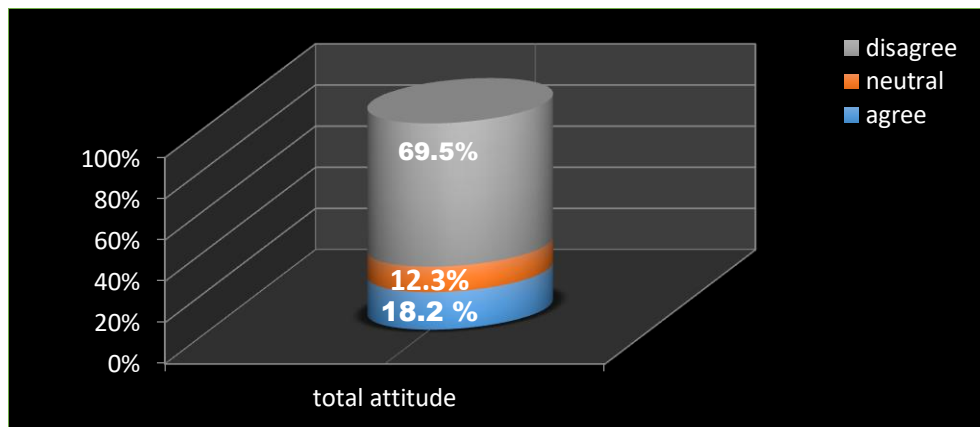


Table (4): Relation between nurses' demographic characteristics and their total Attitude

	Attitude						MCP
	Agree		Neutral		Disagree		
	(N =15)	(N = 10)	(N = 57)				
<u>Gender</u>	N	%	N	%	N	%	
Female	12	80	9	90	46	80.7	
Male	3	20	1	10	11	19.3	0.150
20 >30	5	33.3	2	20.0	10	17.5	
30 >40	7	46.7	3	30.0	29	50.8	
40 >50	2	13.4	5	50.0	14	24.7	
50 >60	1	6.6	0.0	0.0	4	7.0	0.453
<u>Marital state</u>							
Single	5	33.3	4	40.0	14	24.7	
Married	7	46.7	5	50.0	35	61.4	
Divorced	2	13.4	1	10.0	6	10.4	0.295
Widow	1	6.6	0.0	0.0	2	3.5	
<u>Educate level</u>							
Bachelor	6	40	2	20.0	3	5.2	
Technical health institute	8	53.4	8	80.0	50	87.8	

Nursing school	1	6.6	0.0	0.0	4	7.0	0.109
<5	3	20	2	20.0	8	14.0	
5 > 10	2	13.4	7	70.0	33	57.8	0.289
≥ 10	10	66.6	1	10.0	16	28.2	
<u>Attending causes</u>							
Yes	11	73.3	5	50.0	35	61.4	
No	4	26.7	5	50.0	22	38.6	0.180

MCP: P value based on Monte Carlo exact probability P value is significant if

Table (5): Correlation between Nurses’ Knowledge and their Practices, and Attitude toward Nosocomial Infection

Nurse`s Knowledge		
Correlation	(r)	(P)
Practices	0.293	0.44
Attitude	0.303	0.077

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