

# Assessment of Nurses' knowledge and Performance Regarding Infection Control Using Mind Map at Obstetric and Gynecological Departments

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**Abstract:** Mind map is one of the educational strategies which using for vast amount of knowledge into small. Trainer then develops connection among these small sub concepts until knowledge is grasped. This strategy is applicable to nursing education where a large amount of information is presented and assimilated. The aim of this study: to assess Nurses knowledge and Performance Regarding infection control using mind map at Obstetric and Gynecological Departments Design: descriptive design was used. Setting: the study conducted in obstetrics and gynecological departments, Menoufia university hospitals, Menoufia Governorate. Sample: convenient sample technique. Materials & Methods: a total of 55 nursing staff in obstetrics and gynecology department in the period from April 2019 to august 2019 were recruited in the study. Data were collected through questionnaire sheet, observational check list and nurses' opinionnaire sheet. The results: finding of the present study revealed that, there were poor nurses' knowledge and performance regarding infection control the studied sample had poor knowledge, fair and had good knowledge. Also the study had negative performance and some of them had positive performance regarding infection control using mind map. Conclusion: there was poor of nurses' knowledge and practice of infection control using mind map. Recommendation: There is an important need to develop training program about infection control using mind map for all nurses working in obstetrics and gynecology department to increase knowledge and practice.

**Keywords:** knowledge – performance – mind map.

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## 1. INTRODUCTION

While obstetrics and gynecological nurses play a serious role in the women and newborn safe, high quality progress during and after labor. Nurses have many responsibilities; to prepare the labor room with the exact device and essential procedures for inspection instruments, linens, medication administration and scrapping preparations is very vital. It is also essential that the nurse offers the right information about the technique to the patient, to release anxiety and to give descriptions about the progress of the labor process or surgical interventions.( **Abdel Ghani and Berggren, 2016**)

Nurses have a professional and legal responsibility in preventing cross-infection from reaching to the patient.( **Elkin M, Perry A , Potter P.,2019**). Teaching and training are essential for the nursing staff members to improve the quality of health care and to acquire new knowledge and skills. Educational programs are considered as means for providing nurses with theoretical and technical information needed to acquire new skills and to continually improve nursing practice. Also

help nurses to accept responsibilities for their professional development. The knowledge and practices of nurses in relation to infection control were deficient. The implementation of a specially developed program has led to statistically significant improvements in nurses' knowledge and practices (Emam EA, Hassan SA, El-Moghazy D , Mohamed NS, 2015). The well-trained nurse is the backbone of a well-organized department. Today's technical and scientific advances in nursing and increasing consumer demand for high quality health care urged the nurse to keep current in a field that is exploding with new information and increases the need for developing nursing staff education. (Derrick S, Inhorn E , Cowan T, 2017).

Infections in obstetric population can be due to pregnancy related infections and nonpregnancy related infections. Some infections can be incidental due to pregnancy like HIV, appendicitis, cholecystitis, disseminated herpes, etc. The common etiologies of infection during pregnancy are different in the antenatal and postnatal period. In developing countries, HIV, community acquired pneumonia (streptococcal and influenza), and malaria are most important non-obstetric causes of infection. (Miller A, Mandeville J. 2016)

The Scope and Standards of Practice for Nursing Professional Development provides a framework for outlining the role of the NPD specialist in support of these recommendations. There are five key areas of responsibility in the scope of practice that provide a structure for the actions: career development, education, leadership, program management, and compliance initiatives. The strategies suggested in the position paper can be implemented by NPD specialists based on what is appropriate for their specific role and setting. (Wilson, Chris ,2015)

#### Significance of the study

From the researcher's clinical experience it has been observed that increased rate of infections and no application of infection control precautions, The researcher wanted to know the cause of the high rate of infection in obstetrics and gynecological departments, Nurses are experiencing higher workloads due to shortage of nurses as well as to human behavior that is conditioned by education; political and economic constraints on systems. These factors are affecting on nursing knowledge and practice related to infection control in obstetrics and gynecological departments, which lead to the necessity to assess the knowledge performance of nurses' regarding the infection control principles. ( Abd Al Rahman et al, 2015)

This study will provide basic and specific information about nurses' knowledge and practice regarding infection control using mind map. This information will help to develop intervention program for nurses who working in this area.

#### Aim of the study

This study aims to assess nurses' knowledge and performance regarding infection control using mind map at obstetric and gynecological departments.

#### Research questions:

1. What is nurses' knowledge about infection control using mind map at obstetric and gynecological departments
2. What is nurses' practice about infection control using mind map at obstetric and gynecological departments

## 2. SUBJECTS AND METHODS

This study aimed to assess nurses' knowledge and performance regarding infection control using mind map at obstetric and gynecological departments.

#### The subject & methods of the current study were discussed under the following:

**Research Design:** Descriptive research design was used to fulfill the aim of the study.

#### Research Setting:

The study was conducted at Menoufia University hospitals in shebin elkom city – Menoufia Governorate

#### A) Sample type:

This study was done through convenient sample technique.

**B) Sample size:**

All nurses working at obstetrics and gynecological departments in Menoufia University hospitals were included in the study (55) nurses

**Data collection tools:**

The data collection tools for the current study were composed of three tools, a questionnaire sheet, opinionnaire sheet, and an observational checklist.

**1- Structured Interview Questionnaire sheet:**

It was developed by the researcher after reviewing the national and international related literature. This tool consisted of four main parts as the following:

✚ **Part 1:** This part aimed to collect data about demographic characteristics of the study subjects as: nurses' name, age, gender, years of experience and type of previous graduated education if finishing institute of nursing or bachelor of nursing.

**Scoring system:**

This part of the questionnaire contains, items related to nurses age (<25, 26-36), gender as male or female, years of experience (<5, 6-14, 15-25) and type of previous graduated education (technical or high qualified nurse).

✚ **Part 2:** this part aimed to collect data about nurses' opinion regarding the use of the mind map in education, training program, attendance of infection control precautions training programs and using mind map before in their previous academic years and nurses' knowledge regarding using of mind map after lecturing them about mind map and how it can be applied in the training to control infection. It includes their opinion about the methods of teaching of infection control in the department.

**✚ Scoring system:**

The tool has a list of 5 items as:

- Nurse opinion about the way that used to explain infection control, scored as 1 for excellent, 2 for very good, 3 for good, 4 for accepted, 5 for not accepted.
- If they have used mind map in their study before, scored as 1 for yes and 2 for no.
- If the nurse prefer mind map in training, 1 for yes and 2 for no.
- If the answer yes for the previous question why? as open question.
- If the answer no, why? as open question.

**Tool (II): nurses knowledge about infection control:**

It aimed to assess knowledge of nurses regarding infection control precautions where consisted of hand washing, most cost effective means of Infection Control, appropriate isolation precautions, antiseptic for skin, intravenous infusion, a safety box, cleaning of surgical instruments, safe disposal of medical waste, Gloves and Acupuncture through needles or other sharp objects by utilized a written test as data collection tools to achieve the objectives of the study. The written test consisted of 15 questions related to the studied topics as MCQ

**Knowledge assessment:**

- Incorrect answer : scored one
- Correct answer : scored two

This part was guided by (CDC, 2016) and modified by the researcher to assess nurses' knowledge about infection control precautions in their practice in the obstetrics and gynecological departments, containing 15 questions and the total score is 30 score, the score from 18 to 30 is considered satisfactory and the score from 10 to 18 is considered accepted and the score less than 10 is unsatisfactory.

**Tool (III): observational check list:**

It aimed to assess nurses' practice which guided by (APIC, 2017) and modified by the researcher to evaluate nurses' practice about infection control precautions provided to maternity and newborn through different procedures. **It consists of:** Infection control precautions regarding hand hygiene, Putting on Personal Protective Equipment (PPE), Remove (PPE), Follow infection control principals during(perineal care, catheter procedures, dressing changes, emergency medications iv infusion administration, Cannulation, blood transmutation, Handling oxygen equipment, Vital signs assessment, Handling and brushes surgical instruments, Neonatal Sepsis prevention by assessment, care and dressing), Disposal of patient wastes, Operating and delivery room, Labor first stage room & high-risk pregnancy unit, Medication room and med. Charts.

**Scoring system:**

Each correct answer was scored 2 point and 1for wrong one. The total score was 70 marks for practice. The total score for practice about infection control precaution was classified as satisfactory  $\geq 60\%$ , unsatisfactory  $< 60\%$ .

**Administrative and ethical considerations:**

In the planning stage, a written approval was obtained from the dean of the faculty of nursing of Helwan University to the manager of Menoufia university hospitals and the head of obstetrics and gynecological department in Menoufia university hospitals. Above mentioned setting after examination of the study protocol and tools. All nurses were informed about the study aim and procedures and about their rights to participate or refuse, as well as to withdraw. Oral informed consents were obtained from each nurse who agreed to participate in the study.

**Tool Validity:**

The validity was tasted for content validity by jury of three experts in the field of maternal and newborn health nursing. Specialty to ascertain relevance and completeness; reviewed the questionnaire and the intervention for content and face validity. Their comments were reviewed and the necessary modifications were done as involve a lecture about mid map using data show and PowerPoint presentation and how to apply it in training. It was done before the pilot study.

**Tool Reliability:**

Reliability was applied by the researcher for testing the internal consistency of the tool, by administration of the same tool to the same nurses under similar conditions two times using knowledge questionnaire sheet and observational checklist.

**Pilot study:**

A pilot study was carried out on 10% (6 nurses) from the total sample size which were included in the study. The aim of the pilot study was to evaluate the content validity and reliability of the tools going to be used from data collection and find out the possible obstacles or problems that might be face the researcher and interfere with data collection then accordingly tools were modified as common procedures in maternity work. Nurses included in the pilot study were not excluded from the sample because no modification was done to the tools of data collection.

**Field work:**

- Data will be collected at of obstetrics and gynecology department of Menoufia University hospitals in Menoufia Governorate, after explaining the aim of the study to participants and reassuring them about the confidentiality of the data collected.
- A written approval letters was obtained from the Dean of Faculty of Nursing, Helwan University for practice the study in Menoufia University hospitals in obstetrics and gynecology department at Menoufia Governorate including the aim of the study.
- Oral approval was obtained from nursing staff after explaining the purpose of the study.
- Data collections were done in a period of four months from the beginning of March 2019 to the end of June 2019. The researcher collected data for 3 days per week from 11:00 am to 12:00 pm. The sample was divided into small subgroups

of three to five nurses in the space of time during the shifts and when work pressure is little. Firstly the researcher was clarified the aim and the objectives of the study to nurses.

- Study will be conducted by staff nurses by distribution of the tool for them.
- **Administrative Design:**

An official letter requesting permission to conduct the study was directed from the manager of Menoufia University hospitals to obtain their approval to carry out this study. This letter included the aim the study and photocopy from data collection tools in order to get their permission and help for collection of data.

#### Statistical Design:

The collected data were coded and entered into the statistical package for the social science (SPSS V.23.00). Quality control was done at the stages of coding and data entry. Data were presented using descriptive statistics in the form of frequencies and percentages for categorical variables and means and standard deviations for continuous quantitative variables. Qualitative categorical variables were compared using Chi-square (X<sup>2</sup>) test; Qualitative variables were compared using chi-square test, T test and F test. Statistical significance was considered when P-value < 0.05 and highly significant difference obtained at p<0.001.

### 3. RESULTS

- **Table 1:** Distribution of the studied nurses according to the Socio – demographic characteristics. **Table (1) & Figure 1 and 2** shows that nearly two thirds (65.5%) of the studied nurses aged (less than or equal 25 years) as they are in the young age group with mean of (23.6 ± 4.5 years). As regards experience groups, (40%) of them had experience (6 – 14 years), and (36.4%) had experience less than or equal 5 years, with mean of (9.1 ± 3.2 years of experience). Qualifications of the studied nurses was about two third of them (63.6%) technical nurse and (36.4%) as high qualified nurse.
- **Table 2:** Mind mapping experience opinionnaire among studied nurses. **Table (2)** shows distribution of mind mapping experience among studied nurses revealed that majority of studied nurses explained infection control policies within their Obstetrics and Gynecological Departments as good (38.2%) , while (36.4%) of them explained it as acceptable. Also, majority of them (87.3%) did not use mind mapping in their studies. Approximately about three quarter of studied nurses prefer using mind mapping after explanation, as it is Save time and Faster delivery of information.
- **Table 3:** Distribution of the studied nurses according to their knowledge about the Infection Control policies. **Table 3** showed that the majority of the studied nurses as more than three quarters of them demonstrated wrong answer or were didn't know infection control policies. (70.9%), (60%) , and (81.8%) were don't know or showed wrong answer regarding the most common methods of infection in health facilities , recommendations for the prevention, and Using clean gloves in this cases except respectively. In addition, no one of studied nurses answer any knowledge question with complete and correct answer (29.1%). The mean total score of studied nurses' knowledge about Infection Control policies before intervention was (8.4 ±2.3).
- **Table 4:** Studied nurses' responses to total knowledge assessment questionnaire **Table 4** highlight that nurses' knowledge and performance regarding infection control was poor. (11.4± 1.8)
- **Table 5:** mean total knowledge score among studied nurses' responses to total knowledge assessment questionnaire. **Table 5:** show that mean of nurses knowledge was (16.4%)
- **Table 6:** Distribution of the studied Nurses' practice of infection control precautions throughout observational check list for Hand hygiene. **Table 6:** the results was concerned that practice level regarding Hand hygiene (26%)(p≤0.001)
- **Table7:** Distribution of the studied Nurses' practice of infection control precautions throughout observational check list for Putting on and take Remove Personal Protective Equipment (PPE). **Table7:** the results was concerned that practice level regarding Putting on Personal Protective Equipment (PPE) (59.2%), Remove (PPE)(31.38%)(p≤0.001)
- **Table 8:** Distribution of the studied Nurses' practice of infection control precautions throughout observational check list for infection control principals during (perineal care, catheter procedures, dressing changes, emergency medications iv

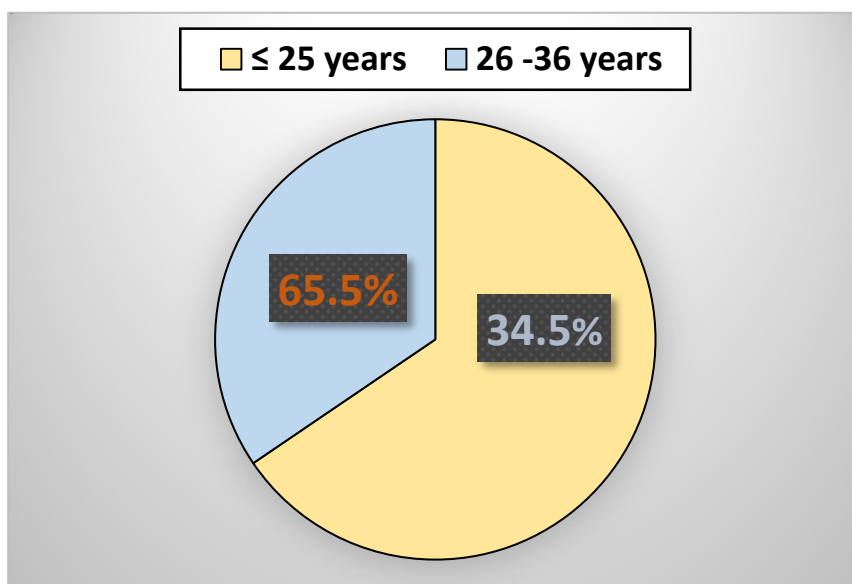
infusion administration, Cannulation, blood transmutation, Handling oxygen equipment, Vital signs assessment, Handling and brushes surgical instruments, Neonatal Sepsis prevention by assessment, care and dressing) and Disposal of patient wastes. **Table 8:** the results was concerned that practice level regarding follow infection control principals during specific maternity procedures (44.35%), (perineal care(29.1%) catheter procedures(23.6%), dressing changes(72.7%), emergency medications iv infusion administration(60%), Cannulation(63.6%), blood transmutation(21.8%), Handling oxygen equipment(27.3%), Vital signs assessment(63.6%), Handling and brushes surgical instruments(43.6%), Neonatal Sepsis prevention by assessment and care and dressing(38.2%) ( $p \leq 0.001$ ).

• **Table 9:** Distribution of the studied Nurses’ practice of infection control precautions throughout observational check list for infection control in Operating and delivery room. **Table 9:** the results was concerned that practice level regarding Operating and delivery room (48.9%) ( $p \leq 0.001$ ).

• **Table 10:** Distribution of the studied Nurses’ practice of infection control precautions throughout observational check list for infection control in Labor first stage room & high-risk pregnancy unit and Medication room and med. Charts. **Table 10:** the results was concerned that practice level regarding Labor first stage room & high-risk pregnancy unit (58.9%) and Medication room and med. Charts (62.1%) ( $p \leq 0.001$ )

**Table (1): Distribution of the studied nurses according to the Socio – demographic characteristics (N = 55)**

Socio demographic characteristics	N0.	%
<b>Age (Years)</b>		
≤ 25 years	36	65.5
26 -36 years	19	34.5
<b>Mean ± SD</b>	<b>23.6 ± 4.5</b>	
<b>Experience groups:</b>		
≤ 5 years	20	36.4
6 – 14 years	22	40
15 - 25 years	13	23.6
<b>Qualifications:</b>		
Technical	35	63.6
High qualified nurse	20	36.4
<b>Mean ± SD</b>	<b>9.1 ± 3.2</b>	
<b>Total</b>	<b>55</b>	<b>100</b>



**Fig. 1: Frequency of age groups of studied nurses (N=55)**

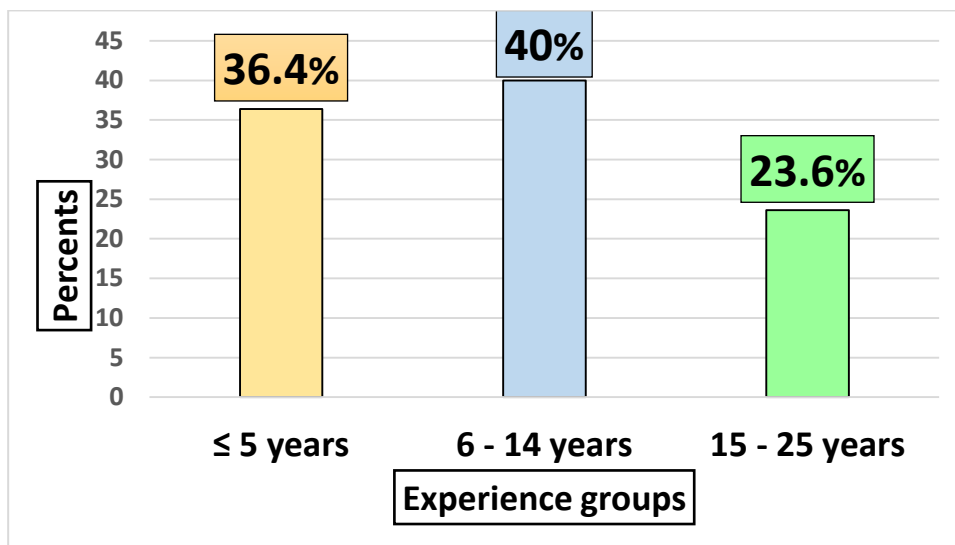


Fig. 2: Frequency of Experience groups of studied nurses (N=55)

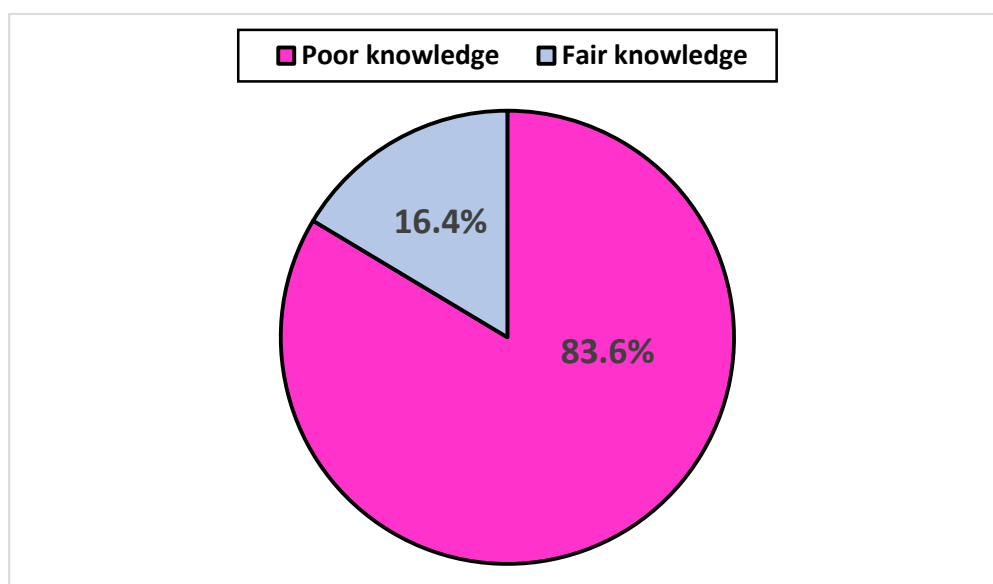
Table 2: Mind mapping experience opinion among studied nurses (N=55)

Mind mapping experience	N0.	%
<b>Nurses' explanation of infection control policies within Obs./Gyn. Department :</b>		
▪ Excellent	1	1.8
▪ Very Good	13	23.6
▪ Good	21	38.2
▪ Acceptable	20	36.4
<b>Previous using of Mind Mapping in their studies:</b>		
▪ Yes	7	12.7
▪ No	48	87.3
<b>Preferring using this training after explanation?</b>		
▪ Yes	43	78.2
▪ No	12	21.8
<b>If yes, why (N=43):</b>		
▪ Save time	21	48.8
▪ Faster delivery of information	22	51.2
<b>If no, why (N=12):</b>		
▪ Prefer traditional explanation	6	50
▪ Easy follow up of patients	3	25
▪ Give nursing courses to follow Infection control policy	3	25
<b>Total</b>	<b>55</b>	<b>100</b>

Table (3): Distribution of the studied nurses according to their knowledge about the Infection Control policies before intervention. (N = 55)

The nurses ' knowledge about the IC policies before intervention	Wrong answer & I don't know		Incomplete correct answer		Complete correct answer	
	No	%	No	%	No	%
The most cost effective means of Infection Control	5	9.1	50	90.9	0	0
The most common methods of infection in health facilities	39	70.9	16	29.1	0	0

The appropriate isolation precautions for the prevention of	24	43.6	31	56.4	0	0
It is an antiseptic for skin and living tissues as well as an	31	56.4	24	43.6	0	0
All of the following shall be deemed to be true for the non	29	52.7	26	47.3	0	0
A tight intravenous infusion requires all of the following	21	38.2	34	61.8	0	0
All of the following statements regarding disinfection	38	69.1	17	30.9	0	0
One of the following is not a safety box	21	38.2	34	61.8	0	0
All of the following is true for the cleaning of instrument	24	43.6	31	56.4	0	0
All of the following recommendations for the prevention	33	60	22	40	0	0
All of the following recommendations for safe disposal of medical waste are valid, <u>except</u>	8	14.5	47	85.5	0	0
Choose the correct phrase from the following statements	16	29.1	39	70.9	0	0
Gloves must be changed in the following cases except	22	40	33	60	0	0
Acupuncture through needles or other sharp objects is the main cause of exposure of staff in health facilities to blood-borne diseases	8	14.5	47	85.5	0	0
Using clean gloves in this cases except	45	81.8	10	18.2	0	0
Mean total knowledge score	<b>8.4 ±2.3</b>					



**Fig. 3: Knowledge groups of studied nurses about infection control policies**

**Fig.3** Demonstrated that majority of nurses as more than three quarters of them were poor in their knowledge about Infection Control policies at their Obstetrics and Gynecological Departments (83.6%) pre intervention .While only less than quarter of them (16.4%) were fair in their knowledge.



**Table 4: Studied nurses responses to total knowledge assessment questionnaire (N=55).**

Knowledge total score groups	N0. %	P value
Poor knowledge (0-10)	46 83.6	X <sup>2</sup> =30.7, P=0.000 HS
Fair knowledge (11-20)	9 16.4	
<b>Total</b>	55 100	

**Table 5: mean total knowledge score among studied nurses responses to total knowledge assessment questionnaire (N=55).**

Mean Knowledge total score	%	P value
X± SD	8.4±2.3	
N	55	

Table 5: show that mean of nurses knowledge was (16.4%)

**Table (6): Distribution of the studied Nurses’ practice of infection control precautions throughout observational check list for Hand hygiene. (n=55)**

					X <sup>2</sup>	p.value
	Met		Not Met			
	No	%	No	%		
<b>Hand hygiene</b>						
Using the right steps for hand washing	14	25.45%	41	74.5%	13.62	0.001
when going from a dirty to a clean area	2	3.6%	53	96.36%	89.005	<0.001
when hands are soiled	8	14.3%	48	85.7%	97.552	<0.001
before and after coming in contact with patient, their equipment or belongings	26	46.4%	30	53.6%	16.225	<0.001
Before cleaning or disinfection is carried out	2	3.6%	54	96.4%	37.463	<0.001
After the risk of exposure to body fluids	20	35.7%	35	63.6%	1.785	0.410
after handling soiled linen	8	14.3%	47	85.45%	70.407	<0.001
before handling clean linen	13	23.6%	42	80.8%	15.004	0.001
All jewelry on Hands are removed and washed	28	50.9%	27	49.1%	1.051	0.591
Bottle of liquid soap is kept in a clean container and labeled daily	20	35.7%	35	63.6%	42.234	<0.001
use of non-touch techniques and skin preparation	18	32.1%	37	67.27%	39.279	<0.001
		26%				

**Table (7): Distribution of the studied Nurses’ practice of infection control precautions throughout observational check list for Putting on and take Remove Personal Protective Equipment (PPE) (n=55):**

					X <sup>2</sup>	p.value	
	Met		Not Met				
	No	%	No	%	%		
<b>Putting on Personal Protective Equipment ( PPE)</b>							
Gown: Put on gown, with opening in the back taking care to cover the entire front and back of uniform. Tie gown securely at back of gown (tie neck first and then waist).	31	56.4%	24	44.6%	21.8%	37.025	<0.001
Mask: Put on mask, with blue facing outward and wire on top. Secure it over the nose, mouth and chin. If mask has ties - tie head first then at neck. If elastic, pull around ears. Press wire around nose.	40	71.4%	16	28.6%	41.8%	1.338	0.512
Goggles: Put on goggles or face shield when appropriate.	38	69.09%	17	30.9%	9.09%	41.113	<0.001
Gloves: Pull cuffs of gown down over part of hands prior to applying gloves. Apply gloves, making sure extending gloves to cover the cuff of the gown sleeve. No exposed skin!	22	40%	33	60%	72.72%	2.818	0.244
<b>Remove PPE.</b>		59..2%					
Remove gloves	12	21.8%	43	78.2%	78.8%	14.661	0.001
Remove goggles/face shield (only if appropriate)	41	74.5%	14	25.45%	20%	1.665	0.435
Remove gown	25	45.5%	30	54.5%	73.1%	8.647	0.013
Remove mask	1	1.8%	54	98.2%	82.7%	83.953	<0.001
Perform hand hygiene immediately after removing PPE.	8	14.3%	47	85.7%	34.6%	65.662	<0.001
Alcohol based hand rubs (ABHR) near point of use	17	30.4%	38	69.6%	58.2%	14.150	0.001
		31.38%					

**Table (8): Distribution of the studied Nurses’ practice of infection control precautions throughout observational check list for infection control principals during (perineal care, catheter procedures, dressing changes, emergency medications iv infusion administration, Cannulation, blood transmutation, Handling oxygen equipment, Vital signs assessment, Handling and brushes surgical instruments, Neonatal Sepsis prevention by assessment, care and dressing) and Disposal of patient wastes. (n=55)**

					X <sup>2</sup>	p.value
	Met		Not Met			
	No	%	No	%		
<b>Follow infection control principals during :</b>						
perineal care	16	29.1%	39	70.9%	10.304	0.006
catheter procedures	13	23.6%	42	76.4	3.191	0.203
dressing changes	40	72.7%	15	27.3%	13.846	0.001
emergency medications iv infusion administration	33	60%	22	40%	22.238	<0.001
Cannulation	35	63.6%	20	36.4%	6.589	0.037
blood transmutation	12	21.8%	43	78.2%	8.739	0.013
Handling oxygen equipment	15	27.3%	40	72.7%	60.681	<0.001
Vital signs assessment	35	63.6%	20	36.4%	65.079	<0.001
Handling and brushes surgical instruments	24	43.6%	31	56.4%	9.473	0.009
Neonatal Sepsis prevention by assessment, care and dressing	21	38.2%	34	61.8%	62.598	<0.001
<b>Total</b>		44.35%				

<b>Disposal of patient wastes</b>						
A red plastic bag marked with the universal warning sign or the word "biohazard" · Impervious to moisture	43	78.2%	12	21.8%	40.080	<0.001
Of a strength sufficient to resist ripping, tearing, or bursting under normal conditions of use and handling (all except sharps)	31	56.4%	24	43.6%	25.575	<0.001
Located away from pedestrian traffic and be vermin and insect free	15	27.3%	40	72.7%	2.645	0.266
Store human tissue as placenta, blood and output of abortion & gynecological procedures in closed area and sent quickly to the mincer for medical waste	12	21.8%	43	78.2%	4.665	0.097
Soiled laundry to be done outside facility is stored in closed, plastic-lined container	33	60%	22	40%	1.093	0.579
Beds and table is clean, unchipped and covered with clean linen and changed from patient to other	10	18.2	45	81.8%	9.408	0.009

**Table (9): Distribution of the studied Nurses’ practice of infection control precautions throughout observational check list for infection control in Operating and delivery room. (n=55)**

					X <sup>2</sup>	p.value
	Met		Not Met			
	No	%	No	%		
<b>Operating and delivery room</b>						
Dry clean, Well ventilated, Containers are washable and cleanable, Items are stored properly, Sterile items within the expiry date and Solutions & multidose vials discarded as recommended	16	29.1%	39	70.9%	1.037	0.595
Scrub facilities are available & well located	23	41.8%	32	58.2%	1.537	0.464
Dirty instruments and waste are properly handled and transported	19	34.5%	36	65.5%	53.910	<0.001
Single use items are not reused	30	54.5%	25	45.5%	19.017	<0.001
Surgical instruments are not washed manually in the theatre	37	67.3%	18	32.7%	64.697	<0.001
Pre-operative skin antisepsis is achieved by the use of the proper antiseptic and being left over the skin for spontaneous drying.	38	69.1%	17	30.9%	8.785	0.012
Sharps wastes and needles are placed in a sharps container and Discard the used sharps object as soon as possible into the sharps container.	29	52.7%	26	47.3%	19.421	<0.001
HLD (high-level disinfected), surgical and disposable gloves of good quality	23	41.8%	32	58.2%	43.934	<0.001
<b>Total</b>		48.9				

**Table (10): Distribution of the studied Nurses’ practice of infection control precautions throughout observational check list for infection control in Labor first stage room & high-risk pregnancy unit and Medication room and med. Charts (n=55)**

	Met		Not Met		X <sup>2</sup>	p.value
	No	%	No	%		
<b>Labor first stage room &amp; high-risk pregnancy unit</b>						
Sterile solutions are dated when opened and disposed of within 24 hours	41	74.5%	14	25.5%	42.950	<0.001
waste bag covered , labeled waste bin and red bags for medical waste	40	72.7%	15	27.3%	23.153	<0.001
	34	65.4%	18	34.6%	37.731	<0.001

enough antiseptic solutions to follow the IP protocol (Enzymatic decontamination detergent/ solution, liquid detergent for cleaning, and chloride solution for surface cleaning	23	41.8%	32	58.2%	.624	0.732
liquid soap or any kind of hand washing disinfectant solution	22	40%	33	60%	26.573	<0.001
<b>Total</b>		58.9%				
<b>Medication room and med. Charts</b>						
Syringes/sharps are disposed of in-impervious container	25	45.5%	30	54.5%	3.201	0.202
Internal and external medications are stored separately and properly	22	40%	33	60%	2.307	0.316
Medication room and charts are clean	38	69.1%	17	30.9%	57.024	<0.001
Refrigerator is clean	30	54.5%	25	45.5%	35.232	<0.001
Supplies and equipment are stored above floor level	41	74.5%	14	25.5%	76.776	<0.001
Sterile solutions are dated when opened and disposed of within 24 hours	49	89.1%	6	10.9%	95.738	<0.001
<b>Total</b>		62.1%				

#### 4. DISCUSSION

The present study aims to assess of nurses' knowledge and performance regarding infection control using mind map at Obstetric and Gynecological Departments in Menoufia university hospitals, Menoufia Governorate.

**Regarding characteristics of the studied nurses** The present study revealed that more than half of nurses their age ranged from 18 >30 years and according to the years of experience, it was found that less than half of them have an experience less than 5 years and half of nurses had diploma nursing education at Obstetric and Gynecological Departments This finding agree with **Khalifa, (2016)** who reported that more than half of nurses' were less than twenty five years old, less than half of them have an experience less than 5 years.

As regarding the nurse's knowledge about the hand washing and scrubbing, wearing gown and wearing the surgical glove, This finding reported that, give incorrect answer about hand washing, this agreement with **Hassan et al., (2017)**. Who mentioned that one third of the nurses incorrectly answered the question about the proper routine and surgical hand washing, one third of nurses give incorrect answer about the need to wash hands after take-off glove. According to **Goodman & Spry, (2014)** stated that, hand hygiene is often considered the single most important step in preventing infection. Operating room personnel like all health care personnel should perform hand hygiene before and after patient contact before donning gloves and after removing gloves.

Regarding the nurses performance most of nurses had unsatisfactory level of practices of the principles of infection control, this finding disagree with **Kabir, (2010)**. which reported that the nurses had low level of knowledge and high level of practice.

This finding was agreement with **Rasha G. M. , Olfat Abd E. Sh. & Moggeda M. (2019)**The present studies observed that the majority of studied nurses were at the age group from 20 to 30 years old, females, technical nursing institute, and most of them had years of experience less than five years. This not in the same line with **Ponikowski et al., (2016)** who mentioned that; the administrators selected older age nurses to be able to perform mainly tasks in the intensive care unit effectively. As well, **Shorofi, & Arbon, (2017)** whom revealed that the majority of nurses working in ICU their ages ranged from 20-40 years, married, female, and have diploma of nursing, more than half of them their experience was more than 5 years.

This result was in the same line with **Considine et al., (2016)** it means when the nurses' experience and qualification increase or if the nurses had training course on their favorable knowledge also improves.

More over all studied nurses were satisfactory level of knowledge after implementation of teaching program, in my opinion for significant improvement in nursing staff knowledge after application of teaching program about infection control application.

According to **Kanki, (2019)** reported that each organization and profession must set standards and objectives to guide individuals and practitioners in performing safe and effective care. Also not only must standards exist, but leader and managers also must see that subordinates know and understand the standards and employee must be aware that their performance will be measured in terms of their ability to meet the established standards.

This was not supported by **Blanton et al., (2018)** who mentioned that; knowledge and practice of health care providers were nearly not in the same level, **Gijare, (2021)** who reported opposite results regarding correlation between knowledge and practice, there was no correlation between knowledge and practice. As well **Askarian, McLaws, & Meylan, (2017)** who found that there was no correlation between knowledge and practice. Generally the present study concluded that; the nurses' knowledge and practice need an improvement so the study aim was achieved this in the same line with **Phillips et al., (2019)** who reported that; there is a need to improve nurses' knowledge and practices related to infection control.

As noted by **Ahmad Ayed et al (2015)** Hospital acquired infection is a common problem all over the world. Therefore, up to date knowledge and nursing skills can play important roles in infection control. Nurses should have the opportunity to practice infection control on a day-to-day basis as an integral part of patients' care. In a study that was conducted at four governmental hospitals in north West Bank districts, Palestine, revealed from the current study, nearly two thirds of the studied sample aged between 20 to 30 years old. This finding is in concordance with that of (**Johnson et al., 2016; Janjua et al., 2017; Reda et al., 2015**) emphasizing the need to protect this group of workers in the prime of their life from hospital infections. The results showed that approximately two thirds of the study group hadn't had previous courses on infection control. Education is a critical element in the training of all HCWs, particularly in countries where there is a lack of formal and well-organized infection control programs. Despite limited resources, developing countries, such as Palestine, still have to deal with complex issues related to occupational exposure to blood borne pathogens and enforcement of standard precautions. In this context, occupational exposure risk is increased, because of the inadequate supply of personal protective equipment, improper disposal of medical waste, and lack of effective needle disposal systems.

The study of **Ahmad Ayed et al (2015)** reported no relationship between knowledge or practice regarding infection control and age, years of experience, and training course of the studied group. In this regards **Hamid et al (2010)**, indicated that, factors such as age and years of experience did not contribute to acquisition of knowledge about blood-borne illnesses or the practice of infection control.

**Ghada A Abdel Hamid, (2017)** document that, in medical education, mind maps enable the student to better integrate information so that it is better organized. This results in the better recall of information.

Supporting the previous results by **Bawaneh, A. (2019)** the recommendation of the study in the current study regarding using of mind mapping as the majority recommend to integrate mind map during their training and using it in workshops, also to be part in the clinical work, while a little number of the sample recommend the using of an exciting teaching methods to have information.

These results are consistent with the results of some other studies. **Akinoglu, and Yasar (2017) and Balm (2016)** emphasized the importance of mind maps in improving studied sample' achievement and understanding concepts.

Finally, the findings of the present study supported the implementation of teaching program about infection control application using mind map to improvement nurses' knowledge and practices about infection control.

## 5. CONCLUSION

**Based on the findings of the present study results were supported research questions, it was concluded that:**

there was poor of nurses' knowledge and practice of infection control using mind map.

## 6. RECOMMENDATION

**In the light of the findings of the study, the following recommendations are suggested:**

- There is an important need to develop training program about infection control using mind map for all nurses working in obstetrics and gynecology department to increase knowledge and practice.

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