

## Nurses ' Performance Regarding the Patients ' Safety Measures in Operating Theater

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### Abstract

**Background:** Operating theater is a very critical and complex area so, it requires close and careful team work attention. Nurses play an indispensable role in the operating theater and influence the success of an operation without complications. Ensuring patients' safety in operating theater begins before the patients enters the operative suit and includes attention to all applicable types of preventable medical errors. **Aim of the study:** to assess nurses' performance regarding the patients' safety measures in operating theater. **Research design:** A descriptive exploratory design was utilized. **Setting:** The study was conducted in operating rooms at Belbies Central Hospital. **Subjects:** a convenient sample of all available nurses in the operating rooms, including 40 nurses from both gender, with different ages, educational levels and years of experience were selected for this study. **Data collection tools:** 1) Self- administered questionnaire, 2) nurses practice observational checklist, 3) nurses' attitude rating scale. **Results:** The results of this study showed that, about two third of the studied nurses had satisfactory total level of knowledge and about three quartant of them had satisfactory total level of practice and about two third of them had satisfactory total level of attitude regarding the patients' safety measures in operating theater. Furthermore, there was a statistical significant correlation between total studied nurses' knowledge, total practice and total attitude. **Conclusion:** The current study concluded that, more than two third of the studied nurses had total satisfactory level of knowledge, positive attitude and the three quarter of them had total satisfactory level of practice regarding the patients' safety measures in operating theater. **Recommendations:** The study recommended the importance of implementing an in-service training programs to improve nurses' performance regarding the patients' safety measures in operating theater. Strict observation of studied nurses during the work and continuous evaluation of their performance.

**Keywords:** Nurses' Performance, Patients Safety Measures, Operating Theater.

### Introduction

The operating theater (OT) is a technical and complex environment where patients are exposed to a range of hazards and OT nurse's responsibility to maintain and protect the patients safety by preventing injuries and complications (*Crafoord et al., 2018*). Although most people understand that patients in ORs undergo risky, highly complex, and potentially life-threatening procedures, they seem much less aware that OTs have many potentially harmful energy devices used by anesthesiologists, surgeons, and nurses. Malfunction or misapplication of these devices can endanger the well-being of both the patient and the operator (*Fuchshuber et al., 2013*).

The OT complex is the 'heart' of any hospital providing surgical services and is a facility within a hospital where surgical operations are carried out in a sterile aseptic environment. Surgical care is complex and prone to errors and subsequent adverse events. The reduction of perioperative harm is a major priority of healthcare and the reporting of incidents and their causes is an important source of information to improve perioperative patients' safety (*Sahran et al., 2018*).

Patient safety is a fundamental value of healthcare to avoid patient harm. Non-compliance with patient safety standards may result in permanent injury, increased length of stay in healthcare facilities or even death, and

is a major global concern. Therefore, ensuring the safety of patient care is to be given the highest priority (*Chevalking et al., 2018*).

The OR teams consist of several kinds of professionals, including surgeons, anaesthesiologists, nurses and surgical technicians. Nurses working in the OR are scrub and circulating nurses. The role of the scrub nurse is to provide skilled assistance to the surgeon and to count things used for surgery, including sponges, needles and instruments during and at the end of the surgical procedure. A scrub nurse works with one or more surgeons during the operation. A circulating nurse works outside the sterile field and coordinates the needs of the surgical team by ensuring that all necessary items are delivered aseptically to the sterile surgical field (*Sonoda et al., 2017*).

The perioperative period begins when the patient is informed of the need for surgery, includes the surgical procedure and recovery, and continues until the patient resumes his or her usual activities. The surgical experience can be segregated into three phases: (1) preoperative, (2) intraoperative, and (3) postoperative. The word “perioperative” is used to encompass all three phases. The perioperative nurse provides nursing care during all three phases. Nursing activities in the intraoperative period center on patient safety, facilitation of the procedure, prevention of infection, and satisfactory physiologic response to anesthesia and surgical intervention (*Goodman & Spry, 2016*).

#### **Significance of the study:**

The surgical volume worldwide has been estimated at 312.9 million operations in 2012, an increase of 33.6 percent over 8 years. Approximately 10% of patients admitted in hospital suffer unexpected accidents or adverse events derived from health care causing to undesirable effects on their health or even death. According to careful estimations, approximately seven million injuries and one million deaths result from surgeries (*Chevalking et al., 2020*).

The World Health Organization (WHO) addresses the issue of patient safety in the OT

in the report *Safe Surgery Saves Lives*, in which complications related to surgical care are identified as a major cause of death and disability worldwide. The report states that unexpected, major complications arise in 3–22% of surgical procedures, that the death rate is estimated as 0.4–0.8% and that a large proportion of these complications may be prevented. Progress has been made regarding patient safety in the OT in recent decades, but the rates of complications and mortality remain too high (*Ingvarsdottir & Halldorsdottir, 2017*).

However, in Egypt there is no available national statistics about major complications arise of surgical procedures. Meanwhile, the medical record of OT of Belbies Central Hospital revealed that the patients who admitted in ORs in the year 2020 were 1600, of them 8 patients representing 0.5% had complications namely surgical site infection (SSI) (*Medical Record of Belbies Central Hospital, 2020*).

Therefore, ensuring the safety of patient care is to be given the highest priority. Safety nursing measures should be considered in three time periods before, during and after surgical procedure to prevent any hazards or complications. The aim of this study is to assess nurses' performance regarding the patients' safety measures in OT. Hopefully this study results will generate attention, finding answers to things that are unknown, filling gaps in knowledge and changing way that nursing team work to be use an a guide for proposing comprehensive safety protocol for promoting the quality of patients care in OR to decrease morbidity and mortality rate.

#### **Aim of the study**

The aim of this study was to assess nurses' performance regarding the patients' safety measures in operating theater through the following:

1. Assessing nurses' knowledge level regarding the patients' safety measures in operating theater.
2. Assessing nurses' practice level regarding the patients' safety measures in operating theater.

3. Assessing nurses' attitude level regarding the patients' safety measures in operating theater.

#### Research questions:

1. What is the nurses' level of knowledge regarding the patients' safety measures in operating theater ?
2. What is the nurses' level of practice regarding the patients' safety measures in operating theater ?
3. What is the nurses' level of attitude regarding the patients' safety measures in operating theater ?
4. Is there relation between nurses' knowledge, practice and attitude level regarding the patients' safety measures in operating theater ?

#### Subjects and Methods

##### Technical Design:

It included research design, study settings, subjects and tools of data collection.

##### Research Design:

A descriptive exploratory design was used to conduct this study.

##### Study Settings:

This study was conducted in operating rooms at Belbies Central Hospital – Sharqiyah Governorate / Egypt.

##### Subjects:

A convenient sample of all available nurses in the operating rooms, including 40 nurses after obtaining their consent to participate in the study.

##### Tools of data collection:

Three tools were used to collect necessary data and fulfill the study aim.

**I- Tool one:** Self- administered questionnaire:

It was developed and modified by the investigator; it was written with Arabic language; it includes the following two parts:

The first part: It was concerned with assessment of demographic data of nurses as (age, sex, level of education, marital status, years of experience, and training courses .....etc.).

The second part: It was concerned with assessment of nurses' knowledge regarding the patients safety measures in operating theater.

#### Regarding scoring system:

The correct answer for each question was given one mark and the incorrect answer was given zero, so the total score of knowledge was 47 marks ; classified into the following :

- Below 85% = < 41 marks was considered as unsatisfactory level.
- 85% and above =  $\geq$  41 marks was considered as satisfactory level.

**II Tool two:** Nurses practice observational checklist:

This tool was covering all phases of surgery (preoperative, intraoperative and postoperative). It was developed by the investigator after reviewing the related literature it was used to assess nurses' level of practice regarding the patients safety measures in operating theater. This tool used in English language from (*Hamlin et al., 2015; Woodman & Walker, 2016; American society of Perianesthesia Nurses, 2017*).

#### ❖ Scoring system:

In relation to nurse' practice, each item was scored "0" for not done or done incorrectly and " 1" mark for done correctly, so the total score of checklist was 187 marks classified into the following ;

- Below 90% = < 168 was considered as unsatisfactory level.
- 90% and above =  $\geq$  168 was considered as satisfactory level.

**III- Tool Three;** Nurses' Attitude rating scale: it used to assess nurses' attitude regarding safety measures for patients in operating room. It will be adopted from *Pinar and Intepeler, (2017), Quintana et al. (2018), Kertesz et al. (2019)*

### ❖ Scoring system

This 3 point likert scale had 3 responses options always, sometimes and rarely:

Always considered positive response and took one grade while sometimes and rarely considered negative response and took zero. So total score of this scale was 19 marks. Classified into the following;  $\geq 90\% = \geq 17$ marks considered positive attitude level,  $<90\% = <17$  marks considered negative attitude level.

### Operational Designed:

The operational design consisted of preparatory phase, validity and reliability, pilot study and fieldwork.

### 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.

### Testing Validity and Reliability:

Content validity was done to identify the degree to which the used tools measure what was supposed to be measured. Tools were examined by a panel of seven experts. The Jury reviewed the tools for clarity, relevance, comprehensiveness and simplicity then based on the opinion of the jury a minor modification was done and final form was developed.

Testing reliability of tools tested by using Cronbach alpha for self administered questionnaire (knowledge) was 0.825 and observational checklist (practice) was reliable at 0.965.

### Pilot study:

A pilot study was conducted to test feasibility and applicability of the tools used in this study. It was carried out on 10% of total study subjects (4 nurses). No modifications were done on the used tools so that, the nurses who included in the pilot study were included in the main study group.

### Fieldwork:

Field work included the following:

1. The approval obtained from the director of Belbies Hospital and the director of nursing before starting the study.
2. The actual work of this study started and completed within four months from October (2020) till the January (2021).
3. The purpose of the study simply explained to every subject who agreed to participate in the study prior to any data collection.
4. The investigator was available all days and filled the observational checklist in the morning and afternoon shifts and the time needed for completing this tool took about 30- 120 minutes for each nurse.
5. Self -administered questionnaire filled by the nurses in operating theater. It took about 30 minutes from each nurse.
6. Nurses' attitude rating scale filled by the nurses in operating theater and it took about 15 minutes from each nurse.

### Administrative Design:

An official letter was issued from the faculty of nursing Ain Shams University to the director of Belbies Hospital which the study was conducted, explaining the purpose of the study and requesting the permission for data collection from the study subjects.

### Ethical considerations:

The ethical research considerations in this study included the following:

- The research approval of protocol was obtained from Scientific Research Ethical Committee in Faculty of Nursing at Ain Shams University before starting the study.
- The researcher clarified the objective and aim of the study to the nurses included in the study.
- The researcher assured maintaining anonymity and confidentiality of the subject data.
- Nurses were informed that they allowed choosing to participate or not in the study and they had the right to withdraw from the study at any time without giving any reasons.
- Ethics, values, culture, and beliefs were respected.

**Statistical Analysis:**

The collected data were organized, analyzed using appropriate statistical significant tests. The data were collected and coded. Then, the data were analyzed with the program (the statistical package for social science) (SPSS) under windows version 20. Number and percentage for qualitative variable were done. For relation between variables, Pearson's correlation test was used to assess the relationship between total knowledge, practice, attitude dimensions. Paired t-test and one way ANOVA were used to examine the relationship between staff nurses' demographic data, knowledge, practice, and attitude. Also, alpha Cronbach's test was used to test reliability of tools. the observed differences and associations were considered as follows: Non significant (NS)  $p > 0.05$ , Significant (S)  $p \leq 0.05$ , Highly significant (HS)  $p \leq 0.001$ .

**Results:**

**Table (1):** showed that 95% of the studied nurses were females, the mean age of nurses included in the study  $27.25 \pm 6.79$  47.5% of the studied nurses' their age ranged between 30- 40 years old & 42.5% of the studied nurses were graduated from nursing institute. Also this table revealed that 70% of the studied nurses were married, 32.5% of them were < 5 years experience, the mean experience years in nursing were  $12.13 \pm 6.20$  and 82.5% of them attended training courses

**Figure (1):** concluded that 70% of the studied nurses had satisfactory level of knowledge regarding the patients' safety measures in operating theater and 30% of studied nurses had unsatisfactory level of knowledge

**Figure (2):** concluded that 75% of the studied nurses had satisfactory level of practice regarding the patients' safety measures in operating theater and 25% of them had unsatisfactory level of practice

**Figure (3):** showed that 72.5% of the studied nurses always had positive attitude regarding the patients' safety measures in operating theater. while only 27.5% of them had negative attitude.

**Table (2):** demonstrated that there were statistically significant relation between total nurses' knowledge mean score regarding the patient safety measures in operating theater and their demographic characteristics including qualifications, ( $P < 0.05$ ).

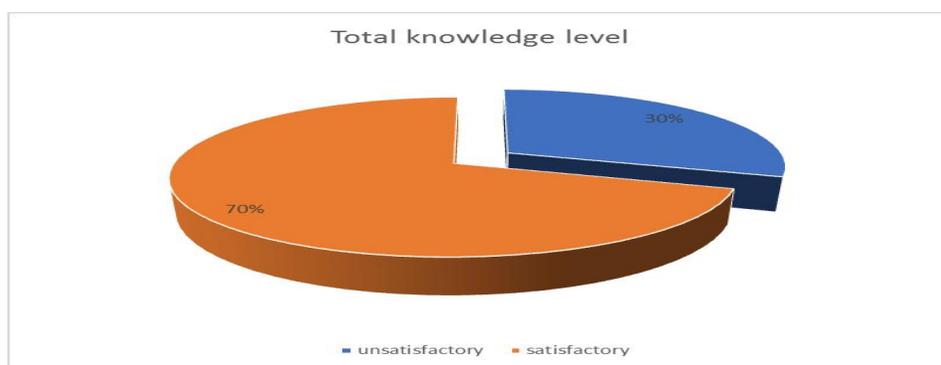
**Table (3):** demonstrated that there was no statistically significant relation between total nurses' practice mean score regarding the patients' safety measures in operating theater and their demographic characteristics ( $P > 0.05$ )

**Table (4):** demonstrated that there was no statistically significant relation between nurses' total attitude mean score regarding the patients' safety measures in operating theater and their demographic characteristics ( $P > 0.05$ ).

**Table (5):** showed that there was significant statistical strong positive correlation ( $r=.73$ ,  $p= 0.04$ ) between nurses' knowledge and practice. There was significant statistical weak positive correlation ( $r=.211$ ,  $p= 0.02$ ) between nurses' knowledge and attitude. There was significant statistical strong positive correlation ( $r=.65$ ,  $p= 0.01$ ) between nurses' practice and attitude regarding surgical safety.

**Table (1):** Percentage distribution of demographic characteristics of the studied nurses under study (n= 40).

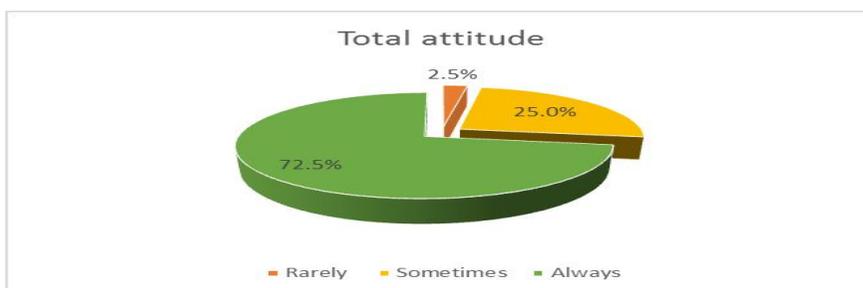
Demographic data	No.	%
<b>Age</b>		
20< 30 years	16	40
30< 40 years	19	47.5
≥ 40 years	5	12.5
<b>Mean± SD</b>		<b>27.25± 6.79</b>
<b>Gender</b>		
Male	2	5
Female	38	95
<b>Qualification</b>		
Nursing diploma	13	32.5
Nursing institute	17	42.5
Bachelors' degree	10	25
<b>Marital status</b>		
Single	11	27.5
Married	28	70
Others	1	2.5
<b>Experience</b>		
< 5 years	13	32.5
5< 10 years	9	22.5
10< 15 years	6	15
≥15 years	12	30
<b>Mean± SD</b>		<b>12.13± 6.20</b>
<b>Attending training courses</b>		
Yes	33	82.5
No	7	17.5



**Figure (1):** Percentage distribution the studied nurses ' total level of knowledge regarding the patients' safety measures in operating theater (n=40).



**Figure (2):** Percentage distribution of the studied nurses total level of practice regarding the patients' safety measures in operating theater (n=40).



**Figure (3):** Percentage distribution of studied nurses total attitude level regarding the patients' safety measures in operating theater (n=40).

**Table (2):** Relation between the studied nurses' total Knowledge regarding the patients' safety measures in operating theater and their demographic characteristics (n=40).

Demographic characteristics	Knowledge		Test result	P
	Mean	SD		
<b>Age</b>				
20< 30 years	35.5625	7.04243	2.695**	.081
30< 40 years	36.5263	4.06022		NS
≥ 40 years	29.2000	10.47378		
<b>Gender</b>				
Female	36.0000	1.41421	.17*	.23
Male	35.1842	6.76180		NS
<b>Qualification</b>				
Nursing diploma	37.0769	4.59096	3.305**	.048
Nursing institute	32.2941	7.70361		*S
Bachelors' degree	37.8000	5.11642		
<b>Marital status</b>				
Single	36.8182	4.11869	.587**	.561
Married	34.7500	7.38680		NS
Others	31.0000	.		
<b>Experience</b>				
< 5 years	35.8462	7.53709	.769**	.519
5< 10 years	35.2222	3.63242		NS
10< 15 years	38.0000	3.79473		
≥15 years	33.1667	8.16682		
<b>Attending training courses</b>				
Yes	35.6970	6.97085	.98*	.22
No	33.0000	4.04145		NS

\*means independent t test, \*\*means one way ANOVA test. NS: p > 0.05 \*S: p ≤ 0.05

**Table (3):** Relation between the studied nurses' total practice level regarding the patients' safety measures in operating theater and their demographic characteristics (n=40).

Demographic characteristics	Practice		Test result	P
	Mean	SD		
<b>Age</b>				
20< 30 years	149.7500	12.44990	.410**	.667
30< 40 years	145.8421	16.92882		NS
≥ 40 years	144.0000	16.62829		
<b>Gender</b>				
Female	161.5000	12.02082	1.40*	.38
Male	146.4211	14.88992		NS
<b>Qualification</b>				
Nursing diploma	147.6923	14.37814	.210**	.811
Nursing institute	148.3529	15.49170		NS
Bachelors' degree	144.5000	16.19499		
<b>Marital status</b>				
Single	151.7273	16.25479	1.264**	.294
Married	146.0000	14.37075		NS
Others	130.0000	.		
<b>Experience</b>				
< 5 years	148.6923	17.14344	.524**	.669
5< 10 years	151.2222	10.62753		NS
10< 15 years	145.3333	15.37097		
≥15 years	143.4167	15.95709		
<b>Attending training courses</b>				
Yes	148.1515	15.41331	.89*	.38
No	142.5714	12.89518		NS

\*means independent t test, \*\*means one way ANOVA test

NS: p &gt; 0.05

**Table (4):** Relation between the studied nurses' total attitude level regarding the patients' safety measures in operating theater and their demographic characteristics (n=40).

Demographic characteristics	Attitude		Test result	P
	Mean	SD		
<b>Age</b>				
20< 30 years	50.1875	3.08153	.225**	.800
30< 40 years	50.7895	3.37604		NS
≥ 40 years	51.2000	4.49444		
<b>Gender</b>				
Female	50.0000	1.41421	.26*	.26
Male	50.6316	3.41239		NS
<b>Qualification</b>				
Nursing diploma	50.3846	3.30501	.480**	.623
Nursing institute	50.2353	3.56247		NS
Bachelors' degree	51.5000	3.13581		
<b>Marital status</b>				
Single	51.2727	3.71728	1.341**	.274
Married	50.1786	3.13940		NS
Others	55.0000	.		
<b>Experience</b>				
< 5 years	51.2308	3.05924	1.094**	.364
5< 10 years	49.4444	3.43188		NS
10< 15 years	52.1667	2.31661		
≥15 years	50.0000	3.86123		
<b>Attending training courses</b>				
Yes	50.9394	3.49052	1.42*	.16
No	49.0000	1.91485		NS

\*means independent t test, \*\*means one way ANOVA test.

NS: p &gt; 0.05

**Table (5):** Correlation between the studied nurses' knowledge, practice, and attitude level regarding the patients' safety measures in operating theater (n=40).

Variables	Pearson Correlation	Total knowledge	Total practice
Total practice	R	.73	
	P	*.04	
Total attitude	R	.211	.65
	P	*.02	**0.001

\*\*HS:  $p \leq 0.001$

NS:  $p > 0.05$

\*S:  $p \leq 0.05$

## Discussion

The operating theatre nurses' (OTNs') have responsibility for patients safety and the care in perioperative practice. Perioperative practice is demanding; it is complex, highly technical and very different compared with other settings. The OTNs are responsible for aseptic technique, instrumentation, infection prevention and complication measures, medical technique, handling of biological preparations, as well as collaborating and planning care in consultation with the patient, surgical team and other healthcare providers. They often work in challenging situations under a fast pace and have to address the basic concepts that are unique in ensuring the surgical patients safety. (Blomberg et al., 2018).

Regarding the study nurses characteristics, the results of the present study revealed that around half of the studied nurses', their ages were between 30 to < 40 years. This might explain that they are adult and tolerate the nature of the work and need of active personnel in operating room and active personnel age usually is less than 40 years. This finding is consistent with *Christiana & Salawu (2021)* study entitled "Outcom of nurse led intervention on knowledge and practice of aseptic technique among surgical nurses in two hospitals teaching" who mentioned 38.4%of the participants were between the ages of 30 to 39 years.

Related to gender, the present results showed that, the majority of the study nurses were females. This may be due to the greater fraction of the nurses in Egypt was females and may be also related to the studying of nursing in Egyptian universities were exclusive for female only till few years ago. This finding is consistent with *Khong et al., (2020)* study entitled "Operating room nurses'

self-reported knowledge and attitude on perioperative pressure injury" who found that most of the nurses were females (99%).

Concerning qualifications, this findings showed that around half of the study nurses were graduated from technical nursing institute, this study agrees with study conducted by *Abdelatif, et al. , (2019)* entitled "Effect of Nursing Guidelines on Patient' Safety Regarding Surgical Positioning at Operating Room" who reported that more than one half of the nurses were technical institute graduates.

Regarding years of experience, the current study showed that about one third of the study nurses had experience less than 5 years. This explains that most of those nurses were newly graduated. This study disagrees with *El-Sherbiny, et al., (2020)* entitled of "Assessment of patient safety culture among paramedical personnel at general and district hospitals" who reported that the largest percentage (44.7%) had between 6 and 10 years of experience and 14 % had between 1and 5years of experience.

The present study finding showed that more than three quarter of the studied nurses attended training courses related to patients' safety measures in OT, however, this reflected positively on their performance (knowledge and practice). The training courses for nurses about patients safety measures in OT is very important to improve their performance that affect positively on quality of care. This finding is inconsistent with *Melekie & Getahun (2015)* entitled "Compliance with Surgical Safety Checklist completion in the OR " who found that, the near of half didn't receive training courses.

Regarding to total level nurses' knowledge regarding the patients safety measures in OT, it was found that less than

three quarter of them had satisfactory knowledge regarding patient safety measures in OT. . This maybe due to adequacy of nurses' knowledge at this area might be as a result of continuous previously attended training courses .This results is consistent with study conducted by *Fajemilehin et al., (2016)* entitled " Safety Practices Employed by Perioperative Nurses in Selected Tertiary Health Institutions in South Westem Nigeria " who reported that the majority of the nurses had good knowledge about safety practices.

Regarding to total level nurses' practice regarding the patients' safety measures in OT, the present study showed that,three quarter of the study nurses had satisfactory practice regarding surgical three phases safety measures. This is may be due to adequacy of the staff, available of supplies and equipment and good job description. This result is inconsistent with *Mohamed et al., (2017)* study entitled "Intraoperative Nurses' Safety Practices: Its Effect on Postoperative Adverse Events among Surgical Patients undergoing General Anesthesia" who showed that studied nurses had unsatisfactory level of practice regarding patient safety along three phases of surgery (sign in, time out, sign out).

While this is agree with *Abbasoglu et al., (2016)* study entitled "The Status of Use of Surgical Safety Check List and Opinions of Nurses" who mentioned that, the most of the nurses (92.4%) used SSCL, and according to 78.1% of the nurses, SSCL was effective in the prevention of medical errors.

Regarding to total level of nurses' attitude regarding the patients' safety measures in OT, the current study revealed that about three quarter of the studied nurses had positive attitude regarding responsibility for application of patients safety standards, committed to apply patients safety standards within operating ward and responsible for implementing patients safety standards within the operating suite. This may be due share of knowledge and experience between them, teamwork amoung professionals play an important role in ensuring patient safety and creating a posiyive culture. This result on the same line with *Sharma et al. (2020)* study entitled "Perioperative Nurses' Awareness and

Attitude about Use of WHO Surgical Safety Checklist in India" who revealed that most of the perioperative nurses (92%) had positive attitude towards implementing SSC to prevet errors.

Regarding the relation between the total nurses' knowledge level and their demographic characteristics, the current study revealed that there were statistically significant relation between nurses total knowledge and their qualifications, regarding the patients safety measures in OT. This means that highly educated where were having updated information about patients safety through that increase their confidence in caring for patients in OR and makes their work evidence based which increases the quality of care given. This findings agrees with *Fashafsheh et al. (2015)* study entitled" Knowledge and Practice of Nursing Staff towards Infection Control Measures in the Palestinian Hospitals" who reported that significant statistical differences were found between mean knowledge scores towards gender and qualification.

Regarding the relation between the total nurses' practice level regarding the patients' safety measures in operating theater and their demographic characteristics, the current study result revealed that there no statistically significant relation. This mean that about three quarter of the studied nurses had satisfactory level of practice regardless of their demographic characteristics. This finding is in agreement with *Mohamed et al. (2018)* study entitled" Effect of Training Program on Nurses' Performance Regarding Infection Control Measures in Caring For Patient with Post-Operative Wound " who reported that there is no statistically significant correlations between nurses' practice and their socio-demographic characteristics regarding infection control measures in caring for patients with post-operative wound.

Regarding the relation between the total nurses' attitude level regarding the patients' safety measures in operating theater and their demographic characteristics, the current study revealed that there no statistically significant relation. This mean that about three quarter of

the studied nurses had positive attitude regardless of their demographic characteristics. between total nurses' attitude and their demographic characteristics. This finding agrees with *Patil & Mythreyee (2017)* study entitled "study to assess the knowledge and attitude regarding standardized surgical checklist in surgery on patients safety among OT staff nurses in selected hospitals at Tumkur" who reported that mean attitude of OT staff nurses as  $r = 0.30$  which was found to be not significant at  $p < 0.05$  level.

Regarding correlation between total level of the studied nurses' knowledge, attitude and practice regarding the patients' safety measures in OT, the current study demonstrated that, there was positive statistically significant correlation with satisfactory level of knowledge. This means that nurses under study had satisfactory level of practice, positive attitude level. It seems reasonable to conclude on the basis of the study findings. The above study result agrees with *Umuhooza et al. (2019)* study entitled "Perceived knowledge and practices of nurses regarding immediate postoperative pain management in surgical wards in Rwanda" and found that there was a weak positive correlation between perceived knowledge and practice of nurses with regards to immediate post-operative pain management in surgical wards in which the knowledge contributed to the observed practice at 14.4%.

Also, this study finding revealed that there was weak positive statistically significant correlation between total level of nurses' attitude and their total level of knowledge. This finding disagrees with *Sharma et al. (2020)* study entitled " Perioperative Nurses' Awareness and Attitude about Use of WHO Surgical Safety Checklist in India" who reported that there was a weak negative correlation between awareness and attitude of perioperative nurses regarding the use of surgical safety checklist.

Also, the current study revealed that there was strong positive statistically significant correlations between total level of nurses' practice and their total level of attitude. This study finding disagrees with *Wahb et al.*

(2016) study entitled " Nurses' Knowledge, Attitude and Practice Regarding Infection Control in Operating Rooms in Port Said Hospitals" Who reported that attitude of the studied nurses negatively correlated with their practice.

### **Conclusion:**

Based on findings of the current study, it can be concluded that, more than two third of the studied nurses had total satisfactory level of knowledge and positive attitude. As well as three quarter of them had total satisfactory level of practice regarding the patients' safety measures in operating theater. Moreover, there was statistically significant positive correlation between total knowledge, practice and attitude level among the studied nurses.

### **Recommendations:**

**Based on the findings of the present study, the following items are recommended:**

- a. Importance of implementing continuous in-service training programs to improve nurses' performance regarding the patients' safety measures in all operating theaters
- b. Standard nursing procedures booklets regarding the patients' safety measures in operating theater should be available in all hospital.
- c. Continuous application of surgical safety checklists in all operating theaters to prevent errors and complications which may occur for the patients during three phases of surgery.
- d. Posters and simple illustrations about patients' safety measures should be available in every operating theater.
- e. Strict observation of nurses during the work and continuous evaluation of their performance regarding the patients' safety measures in operating theater.
- f. A similar study should be replicated on a large sample and other settings to generalize the findings.
- g. Further study should be suggested to evaluate effect of implementing training program based on the studied nurses performance about regarding the patients

safety measures in OT (need assessment) on patients morbidity and mortality rate.

- h. Further study should be suggested to evaluate other factors affecting patients safety measures in OT

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