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Original Article

Evaluation of Healthcare Providers' Compliance with Standard Precautions in Obstetric and Gynecological Operating Theater

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1- ABSTRACT

Background: Standard precautions are protective measures that should be used by health professionals when dealing with obstetric and gynecological woman. **Aim:** This study aimed to evaluate the healthcare providers' compliance with standard precautions in obstetric and gynecological operating theater. **Method:** A descriptive cross-sectional design was used in this study. **Setting:** The study was carried out at obstetric and gynecological operating theater in Mansoura University Hospital, **Sample type:** A convenient sample was utilized. **Study Sample:** The study sample included 120 healthcare providers. **Tool:** One tool consistent of two parts (General characteristic of the health care providers, standard precautions observational checklist). **Results:** The present study demonstrated that 66.7% of anesthesiologists and 65.4% of nurses were compliant with hand hygiene, compared to 57.1% of physicians. Concerning personal protective equipment (PPE), 64.3% of physicians and 78.8% of nurses were compliant with using PPE, compared to 41.7% of anesthesiologists. As regards respiratory hygiene and cough etiquette, a large percentage of physicians, anesthesiologists, and nurses were compliant with them (76.8%, 75%, and 86.5%, respectively). Regarding sharps safety, 71.4% of physicians, 83.3% of anesthesiologists, and 84.6% of nurses were compliant with dealing with sharps safely. Concerning safe injection practices, 67.9% of physicians, 75% of anesthesiologists, and 90.4% of nurses were compliant with them. In relation to sterile instruments and devices, more than half of physicians (55.4%) and anesthesiologists (58.3%) were compliant with using sterile instruments, compared to 82.7% of nurses. For disinfecting environmental surfaces, 78.6% of physicians and 76.9% of nurses were compliant, compared to 33.3% of anesthesiologists **Conclusion:** Majority of the studied nurses were compliant with all previously mentioned standard precautions, while two thirds of physicians and more than half of anesthesiologists were totally compliant with them.

Recommendation: Healthcare providers need more training regarding standard precautions.

***Keywords*:** Compliance, Healthcare providers, Gynecological Operating Theater and Obstetric.

2- Introduction:

Healthcare providers (HCPs) are all people who are engaged in activities that target enhancing health include those who provide health services such as doctors, nurses, laboratory technicians, pharmacists and those providing health management and supporting services such as officers, drivers, cleaners and cooks. Healthcare providers are exposed to a number of occupational risks in healthcare settings including biological, chemical, ergonomic, physical and stress violence **(WHO, 2020).** Standard precautions (SPs) are the measures taken by all healthcare personnel against microorganisms transmitted through the blood and body fluids, secretions, excreta and skin and mucosa, regardless of the presence of a known or suspected infection in the hospital (**Samur, Seren Intepeler, & Lam, 2020).**

Health professionals know the risks to which they are exposed; there is a deficit in compliance with these measures. Thus, it is noted that the insufficiency of a safety culture with regard to biological risks. In this sense, several studies have reported insufficient adherence to (SPs). Standard precautions should be adopted in the care of all patients, it is essential to assess compliance with these measures by health professionals through a valid and reliable instrument, since its use can promote the safety of the professional and the patient, in addition to reducing exposure to occupational risks. The use of an instrument capable of measuring compliance with SP by these professionals makes it possible to identify possible limitations and thus develop management, care and educational strategies that favor satisfactory

adherence to these measures **(Brandão et al. ,2022).**

Nurses are health care professionals providing 24-h care; they are amongst the risk groups most often exposed to microorganisms when patients sneeze, cough, cry, speak, splash, scatter or misuse sharps **(Samur, Seren Intepeler & Lam, 2020).**

2.1 Significance of the study

It was reported that 35 million HCPs worldwide, about two to three million of them every year experience needle sticks injuries (NSIs) that contributed to 40-65% of all hepatitis B virus and hepatitis C virus, and 4.4% of HIV infections globally **(Abuduxike, Acar, Asut, & Cali, 2020).** In addition, data from American hospitals demonstrated that healthcare-associated infections (HAIs) alone account for an estimated 1.7 million infections within a year. The same data also showed 98,987 HAIs associated deaths; of these, 36.3% were for pneumonia, 31% for bloodstream infections, 13.2% for urinary tract infections, 8.3% for surgical site infections and 11.2% for infections of other sites **(Haile, Engeda, &Abdo, 2017).**

Although well-established data was not available regarding the burden of HAIs in Africa, a systematic review done in the region revealed that its magnitude would be much higher than in the developed nations. For instance, one Ethiopian study showed a high level of exposure to blood and body fluids among healthcare workers, which put them at significant risk of HAIs **(Haile, Engeda, &Abdo, 2017).**

There are insufficient studies regarding assessment of the healthcare providers' compliance with standard precautions in obstetric and gynecologic operating theater in Mansoura university hospital, so the researcher decided to conduct this study

2.2 Aim of the study

This study aimed to evaluate the healthcare providers' compliance with standard precautions in obstetric and gynecological operating theater.

2.3 Research questions

Q1. Are healthcare providers complying with standard precautions in obstetric and gynecological operating theater?

Q2. What are the barriers for noncompliance of standard precautions in obstetric and gynecological operating theater?

3. Method

3.1 Study design

A descriptive cross-sectional design was used. A descriptive research design used a wide variety of research methods to investigate one or more variables. The researcher didn't control or manipulate any of the variables, but only observed and measured them **(Sharma, 2018).**

3.2 Study setting

The study was carried out at the obstetric and gynecological operating theater in Mansoura University Hospital. It's located on the third floor and consists of 2 operating rooms with 3 beds, doctors and nursing rooms, one recovery room. Patient flow rate is about 20 cases per day.

3.3 Sample type

A convenient sample was used

43.4 Study Subjects

The study sample included 120 of health care providers (physicians, anesthesiologists, and nurses) who work in obstetric and gynecologic operating theater from the previously mentioned hospital and who accept to participate in the study.

Work force	Nurses	Physicians	Anesthesiologists
Actual No	52	56	12
Sample size	120		

3.5 Sample size calculation

Based on data from literature **(Noaman et al., 2020)**, considering level of significance of 5%, and power of study of 80%, and based on data from literature, the sample size can be calculated using the following formula:

n= (Z1-α/2)^2.SD^2/(d^2)

Where, $Z_{1-\alpha/2}$ = is the standard normal variate, at 5% type 1 error it is 1.96, SD = standard deviation of variable and d = absolute error or precision. So,

n=(1.96) ^2. (0.49) ^2/ (0.124^2) = 119.9

Based on the above formula, the sample size required for the study is 120. **(Noaman et al., 2020)**

3.6 Tool of data collection

Data was collected using one tool which consistent two parts

Part 1: General characteristics of the healthcare providers: It consists of the healthcare provider's general characteristics: age, gender, residence, educational level, …. etc.).

Part II: Standard precautions observational checklist: It was developed from **(Haile et al., 2017b)** and **(CDC, 2019).** This tool was used to assess the level of compliance of healthcare providers to standard precautions at obstetric and gynecological operating theater. It consists of 7 domains (36 items). **First domain** is hand hygiene, it consists of (7 items) such as wash hands before touching a patient, wash hands before clean or aseptic procedures, wash hands after body fluid exposure ……etc. **Second domain** is personal protective equipment, it consists of (8 items) as provide sufficient and appropriate personal protective equipment and ensure it is accessible wearing clean gloves whenever there is a possibility of exposure to any body fluids ……. etc. **Third domain** is respiratory hygiene/cough etiquette, it consists of (4 items) as cover their mouths/noses when coughing or sneezing, use and dispose of tissues……. etc. **Forth domain** is sharps safety**,** it consists of (4 items) as place used sharps in puncture-resistant container at point of use, never bend needles with hands……. etc. **Fifth domain** is safe injection practices consisting of (6 items) such as prepare injections using aseptic technique in a clean area, disinfect the rubber septum on a medication vial with alcohol before piercing……. etc. **Sixth domain** is sterile instruments and devices; it consists of (3 items) as sterilizing all reusable equipment before being used on another patient……etc. **Seventh domain** is clean and disinfected environmental surfaces, it consists of (4 items) as segregate noninfectious wastes in black color-coded dust bin, segregate infectious medical wastes in red colored coded dust bin ……. etc.

Scoring system, the scoring system was scored using a 3-point Likert scale (1 = never, 2 = sometimes, and 3 = always) and scores range from (36-108), scores between (36-72) (less than 60%) are considered not compliant, while scores between (73-108) (60% or higher) are considered compliant.

3.7 Validity of the tools

Data collection tool was tested and juried for the content validity by five specialists in woman's health and midwifery nursing field (Dr.Nadia Yossef, Dr.Eman Fadel , Dr.Samia Ibrahim, Dr.Om Hashim and Dr.Aml Yossef)and the recommended modifications was done as paraphrasing of some sentences and changing the colors of dust bins from red and black to red and blue as per Mansoura University Hospital

4.8 Reliability of tool

Internal consistency and a reliability coefficient (Cronbach's alpha) of the components of the data collection tool was tested by SPSS software. The Cronbach's alpha showed high reliability value of the study tool. The Cronbach's alpha value (internal consistency) of standard precautions domains was 0.902, and of the barriers of noncompliance to standard precautions questionnaire was 0.897 which indicated high reliability.

4.9 Pilot Study

A pilot study was conducted prior to data collection on 10% (12) of the study sample (5 doctors, 5 nurses and 2 anesthesiologists) to evaluate the clarity and applicability of these tools and estimating the time needed for answer. According to the data analysis of pilot results, the necessary modifications were done as paraphrasing of some sentences and changing the colors of dust bins form red and black to red and blue as per Mansoura University Hospital. The sample of pilot study was excluded from the total sample.

3.10 Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Nursing, Mansoura University. An official permission to carry out the study was obtained from the director of predetermined setting after explaining the aim of the study. Prior to the study, a written formal consent was obtained from all health care providers at obstetric and gynecological operating theater in Mansoura University Hospital after explaining the nature and purpose of the study. Participation in the study was voluntary, and each participant had the right to withdraw from the study at any time. Anonymity, privacy, safety and confidentiality were absolutely assured throughout the whole study. The result was used as a component of the necessary research for Master study as well as for publication and education.

3.11 Study Procedure

- The study was conducted for 6 month's period from 11th of December 2022 to 10 May 2023. It was carried out through two phases; preparatory and operating stages.

Preparatory stage

Administrative phase:

Official permission to carry out the study was obtained from the director of Mansoura University Hospital, head of Obstetrics and Gynecology operating theater after explaining the aim of the study, head of woman's health and

midwifery nursing department and from the faculty of nursing ethical committee to conduct the study

Reviewing literature and developing tools phases: The researcher reviewed the national and international literature on theoretical knowledge regarding standard precautions in obstetric and gynecological operating theater and the review collected was a guide for developing the tools of data collection.

Operating Stage:

1- Data Collection Phase

- Data was collected from the obstetric and gynecological operating theater at Mansoura University Hospital after obtaining the written approval from research ethics committee of faculty of nursing, Mansoura University to the head of Mansoura University Hospital.
- Before collecting the data, the researcher introduced herself to each health care provider and obtained their consent to participate in the study after explaining the study's nature and aim.
- The researcher attended the obstetric and gynecological operating theater at Mansoura University Hospital from 9 A.m. to 4 p.m. daily except Friday.
- After that, the pilot study was carried out on 10% of the sample (12); the pilot sample was excluded from the analyzed sample.
- The researcher informed the HCPs of the voluntary nature of the study after they provided informed consent.
- The researcher interviewed each HCPs individually in private setting to assess their general characteristics.
- After that, the researcher assessed HCPs implementation of the standard precautions (hand hygiene, personal protective equipment, respiratory hygiene, sharps safety, safe injection practices, sterile instruments and devices and clean and disinfected environmental surfaces) by using an observational checklist, each HCP took from (45-60) minutes.
- Then the researcher assessed barriers of noncompliance to standard precautions by asking questions and recording the answers, each HCP took from (20-25) minutes to answer the questions.
- The researcher attended the previously mentioned setting and the data were collected from predetermined setting until assessment of the total number of healthcare providers.
- At the end of data collection, the total number of HCPs was 120.

II- Data Analysis:

Data were sorted, organized, categorized and then transferred into specially designed formats. All statistical analyses were performed using SPSS (Statistical package for the social sciences) for windows version 20.0 (SPSS, Chicago, IL). Categorical data were expressed in number and percentage. Chi-square test (or fisher's exact test when applicable) was used for comparison of variables with categorical data. The reliability (internal consistency) test for the questionnaires used in the study was calculated. Statistical significance was set at $p<0.05$.

4. Results

Table 1 shows that the mean age of healthcare providers was (32.2 ±4.2, 34.4 ±3.0, 32.7 ±5.7) respectively for physicians, anesthesiologists and nurses. 55.4% of physicians,54.5% of anesthesiologists, and 51.9% of nurses resided in urban areas. 48.2% of physicians, 58.3% anesthesiologists had master's degrees, and 65.4% of nurses had technical institute.

Figure 1 reveals that 51.8% of physicians, 41.7% of anesthesiologists and 61.5% of nurses had work experience of six years or more**.**

Figure 2 illustrates that 66.1% of physicians, 66.7% of anesthesiologists, and 69.2% of nurses respectively attended training programs regarding patient safety.

Table 2 shows that 46.4% of physicians, 66.7% of anesthesiologists, and 63.5% of nurses always wash their hands before touching the patient.39.3% of physicians, 33.3% of anesthesiologists, and 34.6% of nurses sometimes perform hand hygiene before clean or aseptic procedures. Also 35.7% of physicians, 8.3% of anesthesiologists, and 7.7% of nurses sometimes wash hands after body fluid exposure, also 55.4% of physicians, 58.3% of anesthesiologists, and 44.2% of nurses sometimes wash hands after touching a patient. Moreover 44.6% of physicians, 33.3% of anesthesiologists, and 36.5% of nurses sometimes wash hands between patient contacts. While 58.5% of physicians, 58.3% of anesthesiologists, and 61.5% of nurses never wash hands immediately after removal of gloves, also 55.4% of physicians, 66.7% of anesthesiologists, and 48.1% of nurses never wash hands after touching patient surroundings.

Table 3 shows that approximately half of healthcare providers sometimes provide personal protective equipment and ensure its accessibility. Nearly half of physicians sometimes wear PPE whenever possible, as follows: 46.4% of them wear gloves; 41.1% don't wear gowns; 48.2% wear a waterproof apron; 50.0% wear eye goggles; and 41.1% remove PPE before leaving the work area. On the same side, anesthesiologists sometimes wear PPE whenever possible, as follows: 41.7% of them wear gloves; 33.3% don't wear gowns; 50.0% wear a waterproof apron; 33.3% wear eye goggles; and 41.7% remove PPE before leaving the work area. In comparison to the nurses who demonstrated better results, they always comply with PPE as follows: 59.6% of them wear gloves; 32.7% don't wear gowns; 67.3% wear a waterproof apron; 59.6% wear eye goggles; and 57.7% remove PPE before leaving the work area.

Table 4 shows that 53.6% of physicians, 50.0% of anesthesiologists, and 61.5% of nurses always cover their mouths and noses when coughing or sneezing. Concerning disposing of the tissues, 58.9% of physicians, 50.0% of anesthesiologists, and 48.1% of nurses sometimes use and dispose of tissues. The large percent of the healthcare providers always wash their hands after contact with respiratory secretions, as follows: physicians (62.5%), anesthesiologists (91.7%), and nurses (90.4%). Concerning offering masks to coughing patients, 46.4% of physicians and 55.8% of nurses sometimes offer masks to symptomatic patients, while 66.7% of anesthesiologists never offer masks. And regarding sharps safety Shows that 46.4% of physicians, 58.3% of anesthesiologists, and 98.1% of nurses always place used sharps in a puncture-resistant container at the point of use. Concerning bending needles, 41.1% of physicians, 100% of anesthesiologists, and 94.2% of nurses never bend needles with their hands. A large percentage of anesthesiologists (66.7%) and nurses (65.4%) always avoid removing used needles from disposable syringes, while 50% of physicians sometimes avoid removing them. Concerning recapping needles, 66.7% of anesthesiologists and 61.5% of nurses never recap needles, while only 17.9% of physicians never do so.

Table 5 reveals that while 39.3% of physicians, 66.7% of anesthesiologists and 88.5% of nurses always prepare injections using aseptic technique, sometimes prepare them using aseptic technique. Concerning disinfecting the rubber septum, 75% of anesthesiologists and 76.9% of nurses always disinfect the rubber septum of the medication vial with alcohol, while only 16.1% of physicians do so. The large percent of the healthcare providers always use a new needle or syringe for every patient and use single- dose vials for parenteral medications as follows: physician (76.8% and 60.7%, respectively); anesthesiologist (100% and 58.3%, respectively); and nurses (100% and 88.5%, respectively). Concerning not combining the leftover contents of single-use vials, 66.7% of anesthesiologists and 88.5% of nurses don't always combine the leftover contents of single-use vials for later use, while 35.7% of physicians don't combine them for later use.

Table 6 shows that all anesthesiologists and nurses (100%) always sterilize all reusable equipment before being used again for another patient, compared to half of physicians (58.9%) who always sterilize it. Concerning cleaning and disinfecting equipment, 41.1% of physicians and 58.3% of anesthesiologists sometimes clean and disinfect equipment and surfaces, compared to 94.2% of nurses who always clean and disinfect them. As regards wearing PPE during processing, 51.8% of physicians and 50% of anesthesiologists never wear appropriate personal protective equipment when handling and reprocessing contaminated equipment, compared to 44.2% of nurses who always wear PPE during the handling and reprocessing of instruments. And regarding clean and disinfected environmental surfaces shows that 48.2% of physicians and 50.5% of anesthesiologists always separate noninfectious wastes in a blue color-coded dust bin, compared to 71.2% of nurses who always separate them. Concerning separating infectious medical wastes, 48.2% of physicians and 58.3% of anesthesiologists sometimes separate infectious medical wastes in a red-coded dust bin, compared to 80.8% of nurses who always separate them in a red dust bin. As regards using surface barriers, 53.6% of physicians, 50.0% of anesthesiologists, and 42.3% of nurses sometimes use surface barriers to safeguard clinical contact surfaces. Regards disinfecting clinical contact surfaces, 44.6% of physicians and 33.3% of anesthesiologists sometimes clean and disinfect clinical contact surfaces, in comparison to 82.7% of nurses who clean and disinfect them.

Figure 3 shows that the majority of the studied nurses (80.8%) were totally compliant with standard precautions, while 66.1% of physicians and 58.3% of anesthesiologists were totally compliant with them.

Table 1. Number and Distribution of Studied Healthcare Providers According to Their General Characteristic (n=120)

Items	Physicians		Anesthesiologist		Nurse	
	n (56)	%	n (12)	%	n (52)	%
Age (Years)						
20 – 25	0	0.0	0	0.0	7	13.5
26 – 30	18	32.1	0	0.0	7	13.5
31 – 35	24	42.9	7	58.3	19	36.5
36 or More	14	25.0	5	41.7	19	36.5
Mean ±SD	32.2 ±4.2		34.4 ±3.0		32.7 ±5.7	
Gender						
Male	25	44.6	7	58.3	0	0.0
Female	31	55.4	5	41.7	52	100.0
Residence						
Rural	25	44.6	5	45.5	25	48.1
Urban	31	55.4	6	54.5	27	51.9
Educational level						
Diploma	0	0.0	0	0.0	18	34.6
Institute	0	0.0	0	0.0	34	65.4
Bachelor	22	39.3	2	16.7	0	0.0
Master's	27	48.2	7	58.3	0	0.0
PhD	7	12.5	3	25.0	0	0.0

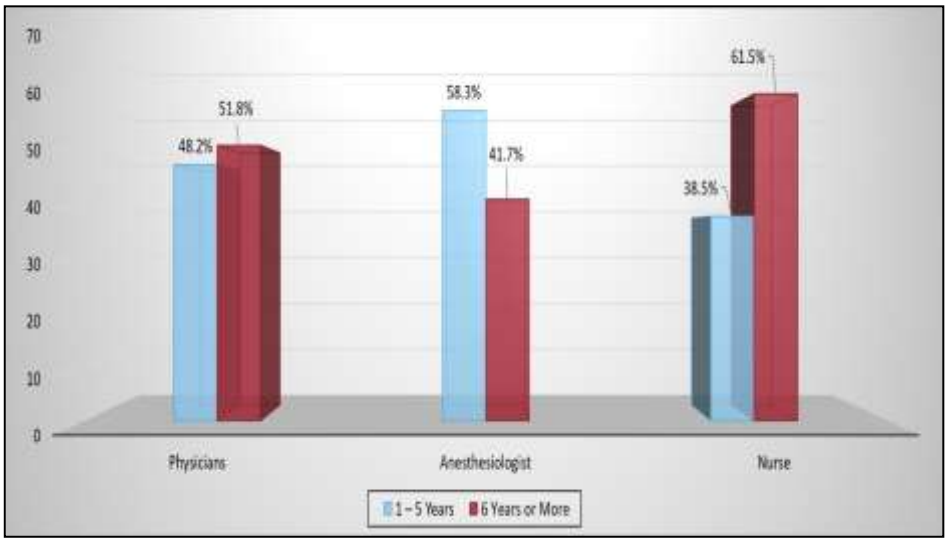

Figure1. Total Years of Clinical Experience Among the Studied Healthcare Providers

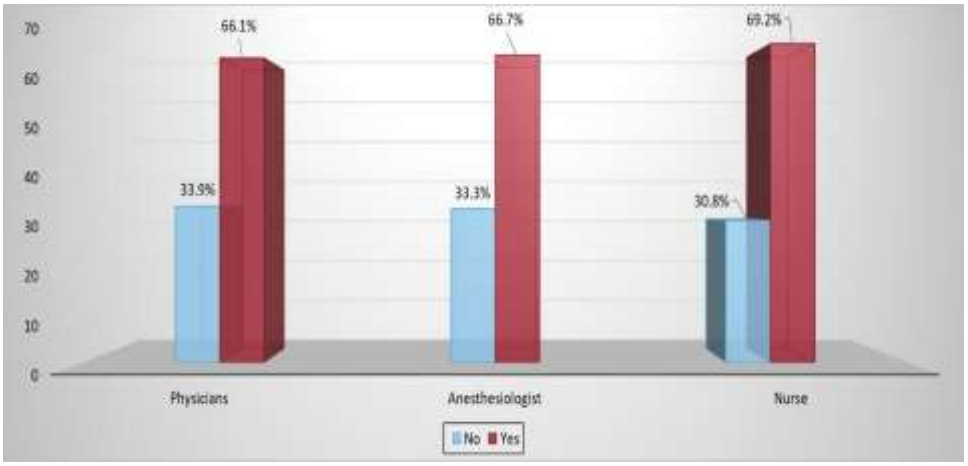

Figure 2. Training Courses Regarding Patient Safety Among Healthcare Providers.

Table 2. Number and Distribution of Studied Healthcare Providers Regarding Their Compliance to Hand Hygiene in Obstetric and Gynecological Operating Theater (n=120)

Items	Physicians (n=56)						Anesthesiologist (n=12)						Nurse (n=52)					
	Never		Sometimes		Always		Never		Sometimes		Always		Never		Sometimes		**Always**	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
-Wash hands before touching a patient	5	8.90	25	44.6	26	46.4	0	0.0	4	33.3	8	66.7	0	0.0	19	36.5	33	63.5
-Wash hands before clean or aseptic procedures	6	10.70	22	39.3	28	50.0	0	0.0	4	33.3	8	66.7	0	0.0	18	34.6	34	65.4
-Wash hands after body fluid exposure	1	1.8	20	35.7	35	62.5	0	0.0	1	8.3	11	91.7	0	0.0	4	7.7	48	92.3
-Wash hands after touching a patient	9	16.1	31	55.4	16	28.6	0	0.0	7	58.3	5	41.7	8	15.4	23	44.2	21	40.4
-Wash hands immediately after removal of gloves	33	58.9	22	39.3	1	1.8	7	58.3	5	41.7	0	0.0	32	61.5	18	34.6	2	3.8
-Wash hands between patient contact	6	10.7	25	44.6	25	44.6	0	0.0	4	33.3	8	66.7	1	1.9	19	36.5	32	61.5
-Wash hands after touching patient surroundings	31	55.4	23	41.1	2	3.6	8	66.7	4	33.3	0	0.0	25	48.1	17	32.7	10	19.2

Table 3. Number and Distribution of Studied Healthcare Providers Regarding Their Compliance to Personal Protective Equipment in Obstetric and Gynecological Operating Theater (n=120)

Items	Physicians (n=56)						Anesthesiologist (n=12)						Nurse (n=52)					
	Never		Sometimes		Always		Never		Sometimes		Always		Never		Sometimes		Always	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
-Provide sufficient and appropriate personal protective equipment and ensure it is Accessible	2	3.6	31	55.4	23	41.1	4	33.3	5	41.7	3	25.0	4	7.7	26	50.0	22	42.3
-Use clean gloves if there is a risk of exposure to any body fluids.	6	10.7	26	46.4	24	42.9	4	33.3	5	41.7	3	25.0	2	3.8	19	36.5	31	59.6
-Changing gloves between contacts with different patients	1	1.8	12	21.4	43	76.8	1	8.3	3	25.0	8	66.7	2	3.8	11	21.2	39	75.0
Avoid wearing gown out of hospital compounds	15	26.8	23	41.1	18	32.1	4	33.3	4	33.3	4	33.3	7	13.5	28	53.8	17	32.7
-Wearing a waterproof apron whenever there is a possibility of body fluid splashing in body	4	7.1	27	48.2	25	44.6	1	8.3	6	50.0	5	41.7	1	1.9	16	30.8	35	67.3
-Wearing eye goggles whenever there is a possibility of body fluid splashing in face	26	46.4	28	50.0	2	3.6	8	66.7	4	33.3	0	0.0	0	0.0	21	40.4	31	59.6
-Perform hand hygiene immediately after removing gloves	24	42.9	27	48.2	5	8.9	6	50.0	6	50.0	0	0.0	36	69.2	16	30.8	0	0.0
-Remove personal protective equipment before leaving the work area	15	26.8	23	41.1	18	32.1	1	8.3	5	41.7	6	50.0	0	0.0	22	42.3	30	57.7

Table 4. Number and Distribution of Studied Healthcare Providers Regarding Their Compliance to Respiratory Hygiene/Cough Etiquette and Sharps Safety (Engineering and Work Practice Controls) in Obstetric and Gynecological Operating Theater (n=120)

Items	Physicians (n=56)						Anesthesiologist (n=12)						Nurse (n=52)					
	Never		Sometimes		Always		Never		Sometimes		Always		Never		Sometimes		Always	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
-Cover their mouths/noses when coughing or sneezing.	4	7.1	22	39.3	30	53.6	0	0.0	6	50.0	6	50.0	0	0.0	20	38.5	32	61.5
- Utilize and dispose of tissues.	3	5.4	33	58.9	20	35.7	0	0.0	6	50.0	6	50.0	1	1.9	25	48.1	26	50.0
-Perform hand hygiene after hands have been in contact with respiratory secretions.	2	3.6	19	33.9	35	62.5	0	0.0	1	8.3	11	91.7	0	0.0	5	9.6	47	90.4
- Provide masks to coughing patients and other symptomatic persons.	15	26.8	26	46.4	15	26.8	8	66.7	3	25.0	1	8.3	19	36.5	29	55.8	4	7.7
-Place used sharps in puncture-resistant container at point of use	4	7.1	26	46.4	26	46.4	0	0.0	5	41.7	7	58.3	0	0.0	1	1.9	51	98.1
-Never bend needles with hands	8	14.3	25	44.6	23	41.1	0	0.0	0	0.0	12	100	0	0.0	3	5.8	49	94.2
-Avoid removing used needles from disposable syringes	5	8.9	28	50.0	23	41.1	0	0.0	4	33.3	8	66.7	1	1.9	17	32.7	34	65.4
-Never recap needles	22	39.3	24	42.9	10	17.9	0	0.0	4	33.3	8	66.7	0	0.0	20	38.5	32	61.5

Table 5. Number and Distribution of Studied Healthcare Providers Regarding Their Compliance to Safe Injection Practices in Obstetric and Gynecological Operating Theater (n=120)

Items	Physicians (n=56)						Anesthesiologist (n=12)						Nurse (n=52)					
	Never		Sometimes		Always		Never		Sometimes		Always		Never		Sometimes		Always	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
-Prepare injections using aseptic technique in a clean area	18	32.1	22	39.3	16	28.6	0	0.0	4	33.3	8	66.7	0	0	6	11.5	46	88.5
-Disinfect the rubber septum on a medication vial with alcohol before piercing	24	42.9	23	41.1	9	16.1	0	0.0	3	25.0	9	75.0	0	0	12	23.1	40	76.9
-Do not use needles or syringes for more than one patient	2	3.6	11	19.6	43	76.8	0	0.0	0	0.0	12	100	0	0	0	0.0	52	100
-Use single-dose vials for parenteral medications when possible	2	3.6	20	35.7	34	60.7	0	0.0	5	41.7	7	58.3	0	0	6	11.5	46	88.5
-Do not use single-dose medication vials, ampules, and bags or bottles of intravenous solution for more than one patient	3	5.4	25	44.6	28	50.0	0	0.0	0	0.0	12	100	0	0	7	13.5	45	86.5
-Do not combine the leftover contents of single-use vials for later use	6	10.7	30	53.6	20	35.7	0	0.0	4	33.3	8	66.7	0	0	6	11.5	46	88.5

Table 6. Number and distribution of studied healthcare providers regarding their compliance to sterile instruments and devices and to clean and disinfected environmental surfaces in obstetric and gynecological operating theater (n=120)

Items	Physicians (n=56)						Anesthesiologist (n=12)						Nurse (n=52)					
	Never		Sometimes		Always		Never		Sometimes		Always		Never		Sometimes		Always	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
-Sterilizing all reusable equipment before being used on another patient	0	0.0	23	41.1	33	58.9	0	0.0	0	0.0	12	100	0	0.0	0	0.0	52	100.0
-Clean and disinfect equipment and environmental surfaces	24	42.9	23	41.1	9	16.1	0	0.0	7	58.3	5	41.7	0	0.0	3	5.8	49	94.2
-Wear appropriate personal protective equipment when handling and reprocessing contaminated patient equipment	29	51.8	17	30.4	10	17.9	6	50.0	6	50.0	0	0.0	6	11.5	23	44.2	23	44.2
-Separate noninfectious wastes in blue color-coded dust bin	2	3.6	27	48.2	27	48.2	0	0.0	6	0.0	6	0.0	0	.0	15	28.8	37	1.2
-Separate infectious medical wastes in red colored coded dust bin	2	3.6	27	48.2	27	48.2	0	0.0	7	58.3	5	41.7	0	0.0	10	19.2	42	30.8
-Use surface barriers to protect clinical contact surfaces	6	10.7	30	53.6	20	35.7	4	33.3	6	50.0	2	16.7	24	46.2	22	42.3	6	11.5
Clean and disinfect clinical contact surfaces	14	25.0	25	44.6	17	30.4	8	66.7	4	33.3	0	0.0	1	1.9	8	15.4	43	32.7

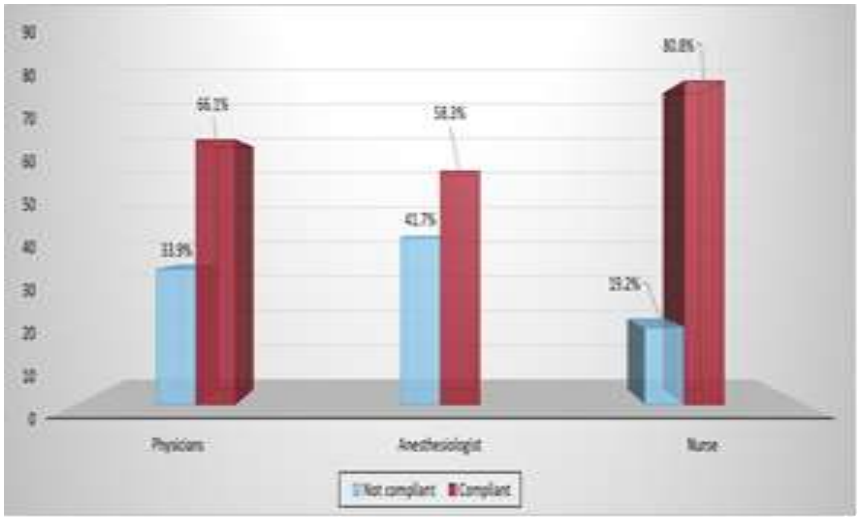

Figure 3. Distribution of standard Precautions Domains Score Among the Healthcare Providers

6. Discussion

The present study was conducted to assess healthcare providers' compliance with standard precautions in obstetric and gynecological operating theater. The study's conclusion validated the goal.

Regarding compliance to hand hygiene in obstetric and gynecological operating theater

The current study's findings demonstrated that over half of doctors always compliance with washing hands after body fluid exposure and almost of nurses are compliance of wash hands after body fluid exposure. The study result was in disagreement with the study conducted by **Dhamnaskar, Chaudhari** and **Koranne (2022)** they studied the adherence of healthcare personnel to hand hygiene recommendations in a tertiary care hospital's emergency surgical room, they reported that around one third of physician and nurses are compliant of wash hands after body fluid exposure. The difference between two studies may be due to lack of supplies and equipment by the hospital.

According to the results of the present research, around 50% of healthcare professionals always wash their hands before handling a patient; however, the results differed from those of the previous study.

by **Dhamnaskar, et al. (2022)** they reported that less than one quarter of staff member were compliance in wash hands before touching a patient. The difference between two studies may be due to failure to follow standard precaution procedures.

The present study results showed that more than one quarter of healthcare providers was always compliance with wash hands after touching a `patient. The current study findings were in same line with the study done by **Dhamnaskar et al. (2022)** who showed that more than one quarter of staff member are compliance of wash hands after touching a patient. The similarity between two studies may be due to hospital program compliance about infection control precaution.

The present study result showed that around three quarter of anesthesiologist always wash hands between patient contacts. The current study findings were in same line with the study done by **Brandão, Luna, Bazilio, LAM, Góes,** and **Ávila (2022)** they studied compliance with standard precautions measures by health professionals in the State of Rio de Janeiro. They reported that around three quarters of health professionals always wash hands between patient contacts. The similarity between two studies results may be due to hospital program compliance about infection control precaution.

The present study finding showed that no one of anesthesiologist always wash hands immediately after removal of gloves. The current study findings were in disagreement with **Brandão et al. (2022)** who reported that almost of health professionals always wash hands immediately after removal of gloves. The difference in studies results may be due to lack of awareness with the importance of hand washing after removal of the gloves.

The present study showed that more than one quarter of nurses always wash hands after touching patient surroundings. The current study findings agreement with **Harun, Anwar, Sumon, Mohona, Hassan, Rahman** and **Styczynski (2023)** they studied healthcare professionals' compliance with hand hygiene and related characteristics in a subset of Bangladeshi tertiary-care facilities, they reported that more than one fifth of nurses wash hands after touching patient surroundings. The similarity between two studies due to knowledge of nurses about infection control program.

The current study result showed that half of physician always wash hands before clean or aseptic procedures. The current study findings disagreement with **Harun et al. (2023)** they reported that more than one quarter of physician wash hands before clean or aseptic procedures. The difference between two studies may be due to difference between hospital policy.

Concerning compliance to personal protective equipment in obstetric and gynecological operating theater

The present study findings revealed that one quarter of anesthesiologist always give enough suitable personal protection equipment and make sure it is accessible that disagreement with a study conducted by **Onubogu et al. (2021)** They studied healthcare personnel's awareness of and adherence to conventional precautions in a tertiary hospital in South-East Nigeria. They reported that more than three-quarters of health worker provider sufficient and appropriate personal protective equipment and ensure it is accessible. The difference in studies results may be due to shortage in availability of hospital resources.

Also, the current study findings revealed that one quarter of anesthesiologist always wearing clean gloves whenever there is a possibility of exposure to any body fluids that disagreement with a study conducted by **Ataro (2024)** they studies Healthcare workers' understanding, attitudes, and usage of personal protection equipment**,** Adare Referral Hospital, Hawassa City, southern Ethiopia. They reported that almost of health worker wearing clean gloves whenever there is a possibility of exposure to body fluids. The difference in studies results may be due to shortage in availability of hospital resources.

The current study findings showed that around half of physician and anesthesiologist sometimes wearing eye goggles whenever there is a possibility of body fluid splashing in face that similar with a study conducted by **Khashaba , El-Gilany, Shalaby,** and **El-Kurdy (2022)** they studied personal protective equipment used by obstetricians and obstetric nurses during the COVID-19 pandemic in Mansoura, Egypt. They reported that fewer of wearing eye goggles whenever there is a possibility of body fluid splashing in face. Moreover, The present study findings revealed that no one of nurses never wearing eye goggles whenever there is a possibility of body fluid splashing in face that disagreement with a study conducted by **Ataro (2024)**. According to their survey, 50% of healthcare professionals wear goggles if there is a chance of bodily fluids splashing into their faces. The discrepancy in study results could be caused by a lack of hospital resources as well as nurses' ignorance of the significance of wearing eye protection.

Also, the present study findings showed that the lowest percentage of nurse never wearing a waterproof apron whenever there is a possibility of body fluid splashing in body. The present study result was agreement with **Brandão et al. (2022)** they reported that the lowest of health professionals never wearing a waterproof apron whenever there is a possibility of body fluid splashing in body. Furthermore, the present study result was agreement with **Ataro (2024)** they reported that more than half of health workers always donning a waterproof apron whenever there is a potentiality of body fluid splashing in body. The similarity between two studies may be due to availability of resources by the hospital.

The current study findings showed that more than three quarter of physician always changing gloves between contacts with different patients that is the same line with a study carried out by **Ataro (2024)**, They reported that almost of health worker changing gloves between contacts with many different patients. Also, the present study agreement with **Asuncion, Pastrana,** and **Salvador (2022).** They studied degree to which medical staff at San Jose, Occidental Mindoro, Philippines, certified birthing facilities adhere to recommended measures. They reported that high compliance of health care workers regarding change gloves between patient contacts. The similarity in studies results may be due to knowledge by physician about important of change gloves and aware of infection control measures.

Regarding compliance to respiratory hygiene/cough etiquette & sharp safety in obstetric and gynecological operating theater

The present study findings showed that more than half of physician cover their mouths/noses when coughing or sneezing. The present study result was agreement with **Khashaba et al. (2022)**, they reported that almost of health care workers wear mask and cover nose or mouth. The similarity in studies results may be due to knowledge by doctors about important of cover their mouths/noses when coughing or sneezing to avoid spread of infection.

Also, the present study showed that no one of nurse never cover their mouths/noses when coughing or sneezing. The present study was disagreement with **Alam et al. (2021)** they studied present state of infection control procedures in Dhaka, Bangladesh's top academic and private hospitals' surgical departments, they reported that more than three fifth of healthcare workers not cover their mouths/noses when coughing or sneezing. The difference between the study results and other studied might be because of the difference in the level of education and experience of nurses.

The current study revealed that less than one tenth of nurses always offer masks to coughing patients and other symptomatic persons that disagreement with **Abalkhail et al. (2021).** They studied healthcare personnel at a University Hospital in Qassim's knowledge, attitude, and application of conventional infection control precautions, Saudi Arabia, they reported that all of health care workers offer mask that must be placed on coughing patients to prevent potential dissemination of infectious respiratory secretions from the patient to others. The difference between the study results and other studied might be due to the difference due to lack of masks by the hospital.

The current study revealed that less than two fifth of physician always use and dispose of tissues that agreement with **Sharmin, Rahman,** and **Sajj (2023).** They studied physician adherence to recommended safety measures when managing patients with viral respiratory diseases at two tertiary level institutions, in Bangladesh, they reported that more than one tenth of physician always use and dispose of tissues. The similarity between the study results and other studied might be due knowledgeable of physician about infection control.

The current study revealed that less than one tenth of physician never perform hand hygiene

after hands have been in contact with respiratory secretions that agreement with **Sharmin, Rahman,** and **Sajj (2023)**, they reported that no one of physician never perform hand hygiene after hands have been in contact with respiratory secretions. The similarity between the study results and other studied might be due knowledgeable of physician about infection control.

The present study findings showed that almost of nurses always place used sharps in puncture resistant container at point of use. The present study result was agreement with **Mukherjee, Karkada,** and **Vandana (2020).** They studied healthcare personnel's current intravenous (IV) medication management procedures and obstacles to safe practices in a particular facility of Udupi district, Karnataka. They reported that almost of healthcare workers always place used sharps in puncture resistant container at point of use. The similarity between two studies result may be due to a lot of infection control session by the hospital

In addition, the present study showed no one of nurse never place used sharps in puncture resistant container at point of us. The present study was disagreement with **Ibeid, Fahmy,** and **Abd El-Gawad (2021)** they studied assessment of nurses' knowledge and performance regarding infection control using mind map at obstetric and gynecological departments ,Menoufia University hospitals in shebin elkom city, Menoufia Governorate, they reported that more two quarter of nurse place used sharps in puncture resistant container at point of us .The difference between the study results and other studied might be due to unaware of nurses in another hospital about infection control measures.

The present study showed that more than half of anesthesiologist always never recap needles. The present study was disagreement with **Endalew et al. (2022)** they studied healthcare workers' compliance with standard precautions and associated factors in Bahir Dar Town, Ethiopia. they reported that more one quarter of healthcare workers never recap needles. Also, the present study result was in agreement with **Uwaibi, Omozuwa,** and **Omuemu (2020)** they studied knowledge and practice of injection safety in routine immunization among healthcare workers in primary health care centers in south west nigeria. they reported that more than half of healthcare workers never recap needles. The similarity between two studies may be due to hospital program about how to deal with sharp object.

The present study showed around two quarter of physician sometimes never bend needles with hands. The present study was disagreement with **Endalew et al. (2022)** they reported that very little of healthcare workers sometimes never bend needles with hands. Also, the current study showed that no one of nurses never bend needles with hands. The present study not the same line with **Endalew et al. (2022)**, they reported that less than two fifth of health workers never bend needles with hands. The difference between two studies may be due to infection hospital policy.

Regarding compliance to safe injection practices in obstetric and gynecological operating theater

The present study findings revealed that no one of nurses and anesthesiologist never prepare injections using aseptic technique in a clean area. The present study result was disagreement with **Mukherjee, Karkada,** and **Vandana (2020)**. They reported that almost of healthcare workers never prepare injections using aseptic technique in a clean area. The difference between the study results and other studied might be due to the difference in the level of education and experience of nurses.

The current study results showed that no one of nurses never disinfect the rubber septum on a medication vial with alcohol before piercing. This result was in disagreement with **Mukherjee, Karkada,** and **Vandana (2020)** they reported that more than half of health workers not apply disinfect the rubber septum on a medication vial with alcohol before piercing. The difference between the study results and other studied might be due to the difference in the level of education and experience of nurses and aware about infection control measures.

Also, the current study results showed that more than three quarters of nurses always disinfect the rubber septum on a medication vial with alcohol before piercing. This result was agreement with **Uwaibi, Omozuwa,** and **Omuemu (2020), they** reported that almost of healthcare workers always disinfect the rubber septum on a medication vial with alcohol before piercing, while the present study finding was contrast with **Alam et al. (2021)** they reported that almost of healthcare workers disinfect the rubber septum on a medication vial with alcohol before piercing. The similarity between two studies result may be due to infection control session about how to deal with medication.

The present study result showed that all of anesthesiologist always do not use needles or syringes for more than one patient. The present study findings similar with a study conducted by

Alam et al. (2021) they reported that almost of healthcare workers do not use needles or syringes for more than one patient. The similarity between studies was knowledge of anesthesiologist about important of not use needles or syringes for more than one patient to prevent spread of disease and infection.

Moreover, the present study result showed that almost of nurses always use single-dose vials for parenteral medications when possible. The present study findings similar with a study conducted by **Tabor, Shalemariam, Alemu,** and **Gorems (2023) t**hey studied the Jimma medical center's isolates' resistance to antibiotics and the bacterial contamination of single- and multiple-dose parenteral injection vials following their opening, Jimma, Southwest Ethiopia, they reported that almost of healthcare workers use single-dose vials for parenteral medications when possible. The similarity between studies was knowledge of nurses about important of infection control to prevent spread of disease and infection to patient.

Regarding compliance to sterile instruments and devices and to clean and disinfected environmental surfaces in obstetric and gynecological operating theater

The present study showed that almost of nurses always sterilizing all reusable equipment before being used on another patient. The current study result was disagreement with **Bekele, Ashenaf, Ermias,** and **Arega Sadore (2020)** they studied compliance with standard safety precautions and related elements among healthcare workers in Hawassa University comprehensive, specialized hospital, Southern Ethiopia, they reported that near to two third of healthcare workers nurses always sterilizing all reusable equipment before being used on another patient. The difference between studies result may be due to policy of hospital about sterilization technique.

Also, the current study showed that no one of anesthesiologist sometimes sterilizing all reusable equipment before being used on another patient. The current study result was disagreement with **Endalew et al. (2022)** they reported that more than two fifth of health workers sometimes sterilizing all reusable equipment before being used on another patient. The difference between studies was due to lack of equipment.

The current study showed that more than two fifth of physician never clean and disinfect equipment and environmental surfaces. The current study result was disagreement with **Bekele, Ashenaf, Ermias,** and **Arega Sadore (2020)** they reported that less than one fifth of healthcare workers never clean and disinfect equipment and environmental surfaces. Also, the current study showed that most of nurses always clean and disinfect equipment and environmental surfaces. while the current study result was contrast with **Endalew et al. (2022)** they reported that more than one fifth of health workers always clean and disinfect equipment and environmental surfaces. The difference between two studies may be due to hospital policy.

The current study showed that more than one quarter of physician always wear appropriate personal protective equipment when handling and reprocessing contaminated patient equipment. The current study result was agreement with **Sharmin, Rahman,** and **Sajj (2023)** they reported that more than one quarter of physician always wear appropriate personal protective equipment when handling and reprocessing contaminated patient equipment**.**

The current study revealed that less than two third of nurses always separate noninfectious wastes in blue color-coded dust bin that agreement with **Mahmoud** and **Negm (2022)** they studied effect of an educational program for nurses working in maternal and child healthcare centers about health care waste management ,Maternal and Child Healthcare Centers in Zagazig City, Sharikia Governorate, Egypt , they appeared that less than two third of nurses always separate noninfectious wastes in blue color-coded dust bin. The similarity between studies due to infection control program continuously.

The current study revealed that no one of nurses and anesthesiologist never separate noninfectious wastes in blue color-coded dust bin and separate infectious medical wastes in red colored coded dust bin that disagreement with **Abalkhail et al. (2021)** they reported that almost of segregation of clinical and non-clinical waste is important for preventing the spread of infection**.** The difference between two studies result may be due to difference of hospital policy between two hospitals.

The current study showed that no one of anesthesiologist always clean and disinfect clinical contact surfaces The current study result was disagreement with **Bekele, Ashenaf, Ermias,** and **Arega Sadore (2020)** they reported that more than three fifth of healthcare workers always clean and disinfect clinical contact surfaces. The difference between two studies result may be due to difference between two-hospital policies.

In addition, the current study showed that more than two fifth of physician sometimes clean and disinfect clinical contact surfaces. The study result was disagreement with **Brandão, De Luna, Bazilio, Lam, Góes,** and **Ávila (2022).** They studied compliance with standard precaution measures by health professionals: comparison between two hospitals, they reported that more than one quarter of health care workers sometimes clean and disinfect clinical contact surfaces and equipment after use. The difference due to shortage of knowledge by physician about clean and disinfect clinical contact surfaces

Regarding domain of standard precautions of health care providers

The present study showed that more than half of physician complaint of hand hygiene. The current study result was corresponding well with **Beyamo, Dodicho,** and **Facha (2019)** they studied adherence to recommended precautions and related variables among medical professionals in Dawuro Zone, South West Ethiopia, they reported that more than half of health care workers complaint of hand hygiene.

The recent study indicated that less than a quarter of nurses did not complain about personal protection equipment. The same results were also reported by **Beyamo et al. (2019)** they reported that less than one quarter of health care workers not complaint and poor to personal protective equipment. Also, the current study result was agreement with **Sharmin, Rahman,** and **Sajj (2023)** they reported that little of physician not compliant of personal protective equipment

The current study showed that one quarter of anesthesiologist not complaint to safe injection practices .The present findings were in disagreement with the study done by **Beyamo et al. (2019)** they reported that more than one tenth of healthcare workers poor and not complaint to safe injection practices.

Also, the current study demonstrated that more than three fifths of physician complaint of sharps safety that agreement with **Beyamo et al. (2019)** they reported that more than three fifth of health care workers good and complaint of handling sharps practice

The present study revealed that more than two fifth of physician not complaint of sterile instruments and devices that disagree with **Beyamo et al. (2019)** they reported that less than one fifth of healthcare workers poor or not complaint of sterile instruments or devices.

The current study found that less than one quarter of physician not compliant of respiratory hygiene/cough etiquette that disagreement with **Sharmin, Rahman,** and **Sajj (2023)** they reported that no one of physician not compliant of respiratory hygiene/cough etiquette. Also, the present study showed that more than three quarters of physician complaint of clean and disinfected environmental surfaces that disagreement with **Sharmin et al. (2023)** they reported that more than one third of physician compliant clean and disinfected environmental surfaces

7. Conclusion

The current study's findings indicated that two third of anesthesiologist and nurses were complaint with hand hygiene compared to more than half of physician concerning personal protective equipment, two third of physician and more than three quarter of nurses were complaint with using PPE compared to less than half anesthesiologist. As regards respiratory hygiene and cough etiquette, a large more than three quarters of physician, anesthesiologist and nurses were complaint with the regards sharp safety, more than two third of physician, majority anesthesiologist and nurses were complaint with dealing with sharp safety. Concerning safe injection practice, more than two third of physician compared to three quarters of anesthesiologist and most of nurse were complaint with them. In relation to sterile instrument device more than half of physician and anesthesiologist were complaint with using sterile instrument compared to majority of nurses. For disinfecting environment surface more than three quarters of physician and nurses were complaint compare to one third of anesthesiologist, the majority of studied nurses were complaint with the previous maintained standard precaution, while two third of physician, more than half of anesthesiologist were totally complaint with them.

8. Recommendations

Based on the study finding, the study is recommending the following

-Healthcare providers need educational program about compliance to standard precautions in obstetric and gynecological theater

-Healthcare providers need more training regarding importance of hand washing immediately after donning of gloves and after handling patient surroundings

-Physicians and anesthesiologists need confirmation about wearing eye goggles

whenever potentiality of body fluid splashing in face

-Importance of healthcare providers to provide masks to patients and other symptomatic persons

-Teaching healthcare providers about the importance of compliance to deal with sharp object.

-Provide training session about how to deal with sterile instrument.

Further studies are recommended to investigate

- Factors associated with the compliance of standard precautions.
- Effect of nursing guidelines compliance to SPs among nursing student

-Teaching healthcare providers about the importance of compliance to deal with sharp object.

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