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Effect of World Health Organizational Surgical Checklist Application on Patients' Safety and Postoperative Complications

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Abstract: *Nurses play an important role in confirming the finest care provided to ensure patients' safety. Nursing is extant to all stages of surgery; the perioperative; intraoperative and postoperative period, which being considered the essential group and agent of change for the transformation of the health system to make it safer. Surgical mistakes may start before operation until the patient discharge from operating room that may cause many postoperative complications and threaten patient's life.* ***Aim of the study:*** *to evaluate the effect of World Health Organizational Surgical Checklist Application on Patients' Safety and Postoperative Complications.* ***Design:*** *Quasi-experimental design was used to test the research hypothesis.* ***Subjects:*** *A purposive sample of 200 patients were divided randomly and alternatively into two equal groups 100 patients(study and control group): For study group (I): implementation of modified World Health Organization surgical safety checklist for undergoing a surgical procedure, the checklist became part of the patient's paper-based notes and attached to the medical record of the patient; and measured the rate of surgical complications after surgery or until discharge ; For control group (II): routine guidelines of hospital for patients undergoing surgical intervention.* ***Setting:*** *The current study was conducted at operating room and surgical unit in Shebin El-Kom Teaching Hospital; Menoufia.* ***Tools for data collection:*** *two tools were utilized as follows:* ***Tool (I): Semi constructive questionnaire sheet; divided into two parts: Part 1:*** *Sociodemographic and medical data;* ***Part 2: Postoperative complications follow up sheet****;* ***Tool (II): Modified World Health Organizational Surgical Checklist****; it was adapted from World Health Organization (2008); it designed a 19-item to ensure the safety of surgical patients and lessen the frequency of surgical complications.* ***Results:*** *there was a statistical significant difference between both groups regarding all items of modified World Health Organizational Surgical Checklist during three phases* ***(sign*** *in; time out and sign out); also there was a highly statistical significant difference between both groups regarding postoperative complications.* ***Conclusion****: application of* ***World Health Organizational*** *(WHO) surgical checklist for patients undergoing any type of surgical procedures considered a successful method for lowering harm and improving patients' safety.* ***Recommendation:*** *based on results of current study, the researchers recommended that; the surgical checklist must be become a part of routine surgical care to reduce harm, postoperative complications and enhance patients' safety.*

Keywords: ***World Health Organizational Surgical Checklist****;* ***Patients' Safety****;* ***Postoperative Complications.***

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I. Introduction

Patient's safety is the main aspect of patient care specially when performing surgical operation, the world health organization developed surgical checklist to prevent surgical complications, enhance patient' safety. It clarify the patient safety is forbid an errors and adverse effect to patients connected with health care [(1)].

The surgical complications lead to high rate of disability and death but can be preventable. For this purpose the World Health Organization (WHO) prepared campaign titled as Safe Surgeries Saves Lives" as part of the World Alliance for Patient Safety that aimed to increase awareness of professional to enhance quality of care [(2)].

Surgical mistakes may start before operation until the patient discharge from operating room that may threaten patient's life. Adverse effects generally include postoperative fever, atelectasis, wound infection, embolism and deep vein thrombosis [(3)].

Surgical safety is basic process of competent care, dependent on the ability of surgical staff to identify, manage safety dangerous by modify their work. Safety happens at the circumstance of the event as well as available of resources [(4)].

World health organization and other organization approved 6 International Patient Safety goals which aimed to eliminate wrong-site, wrong-patient, and wrong-procedure. Surgery by using checklists just before starting a surgical procedure, to ensure the correct patient, procedure and body part [(5)].

Checklist control or reducing tragic errors that happen from surgery as incorrect site, wrong patient surgery, improving inter-professional communications, and enhancing work satisfaction. Checklists have become common place in healthcare practice. It emphasis on several critical components of patient safety: proper anesthesia and airway function, correct surgical site, infection prevention, and effective teamwork [(6)].

The World Health Organization (WHO) surgical safety checklist is the most widely used surgical checklist, comprising of three parts: before induction of anesthesia, before surgical incision, and before the patient leaves the operating theatre. It is now considered a substitute sign for quality of patient care [(7)].

In the surgical situation, nurses play an important role in confirming the finest care provided to ensure patient 'safety. Nursing is extant to all stages of surgery; the perioperative; operative and postoperative period, which being considered the essential group and agent of change for the transformation of the health system to make it safer [(8&9)].

Significance of the Study:

Problems associated with surgical safety are well recognized in developed and developing countries alike. In the developing world, the poor state of organization management, improper equipment, deficiency in supplies ,quality of medications, lack in training personnel and infection control, and under-financing that contributing to these difficulties. So it is important to apply WHO checklist to maintain patients' safety.

Aim of the study: to evaluate the effect of World Health Organizational Surgical Checklist application on Patients' Safety and Postoperative Complications.

Research hypothesis:

1-There will be relationship between World Health Organizational Surgical Checklist Application & Patients' Safety and lowering the incidence of postoperative complications in study group compared to control group.

II. Subjects and Methods

Research design: Quasi-experimental design was used to test the research hypothesis.

Research setting: The current study was conducted at operating room and surgical unit in Shebin El-Kom Teaching Hospital, Menoufia - Egypt.

Sample: A purposive sample of 200 patients who undergoing different type of surgery. They agreed to participate in the study and fulfill the inclusion criteria. The study subjects were divided randomly and alternatively into two equal groups 100 patients in each as follows: 1-The study group (I): a modified WHO surgical safety checklist implementation for study group undergoing a surgical procedure, the checklist became part of the patient's paper-based notes and attached to the medical record of the patient; and measured the rate of surgical complications after surgery or until discharge 2- The control group (II): under the routine guidelines of hospital for patients undergoing surgical intervention.

- ***Inclusion criteria:*** a) Adult patients from both sexes, b) all surgical patients agreed to participate in the study.
- ***Exclusion criteria***: a) immunosuppressive disease, b) Patients undergoing chemotherapy.

Duration of data collection: Data were collected throughout a period 8 months; from the beginning of March to the end of October 2019.

Tools for data collection: two tools were utilized by the researchers to achieve the aim of the study and to collect the necessary data.

Tool (I): **Semi constructive questionnaire sheet; divided into two parts:**

Part 1: Sociodemographic and medical data; this tool developed by the researchers to obtain socio-demographic and medical data, included gender; age; type of surgery; type of anesthesia; chronic disease or underlying disease; previous surgery.

Part 2: **Postoperative complications follow up sheet**: this tool developed by the researchers to assess the incidence of postoperative complications as postoperative fever; wound infection; urinary retention among studied groups.

Tool (II): **Modified World Health Organizational Surgical Checklist**; it was adapted from World Health Organization (2008) [(10)]; it designed a 19-item checklist planned to be worldwide valid; to ensure the safety of surgical patients and lessen the frequency of surgical complications worldwide. This checklist modified by the researchers.

Validity: Before starting, the data collection tools were translated into Arabic and tested for its content validity by a group of experts in the medical-surgical nursing to ascertain relevance, completeness, coverage of the content and clarity of the questions. The required modification was carried out accordingly.

Reliability of the tool (I) part two: It was done by using tool twice and then compares the consistency of answers by the same respondent. Accordingly, the necessary adjustment will be carried out. Chronbach's alpha was practical for the reliability of the questionnaire and was established to be 0.84.

Reliability of the tool (II): The intraclass correlation coefficient was 0.84.

Pilot study: was done by 10 % of stroke's patient and before starting the actual data collection. Subjects who participated in the pilot study were included in the study sample.

•Human rights and ethical considerations: An official permission was taken from the authoritative personal in the hospital. The researchers introduced themselves to the surgical patients who met the inclusion criteria and informed them about the aim of the current study in order to obtain their acceptance to share in this study. Confidentiality and anonymity of them were assured through coding the data.

Field work:

Permission to conduct the study was obtained from the surgical authorities of Shebin El-Kom Teaching Hospital. Menoufia.

Data were collected throughout a period 8 months; from the beginning of March to the end of October 2019.

Prior to the initial interview, the researchers met the head nurse and nurses of the surgical ward, anesthesiatist, surgeon and explained the aim of research, important of WHO checklist, phases of it that; when applied maintain patient's safety and prevent of postoperative complications, then the researchers asked the surgeon and head nurse about the patients who involved in operational list.

The researchers met patients and selected according to inclusion criteria before operation and talk with those patients, explained items and phases of WHO checklist day or two days before operation room, the researchers presented with doctor of anesthesia during the physical assessment for cases, then applied WHO checklist before, which included the following items:

A) Phase one or sign in (7 Items): before induction of anesthesia, included: members of the team (at least the nurse and an anesthesia professional) orally confirm that: the patient has verified his or her identity, the surgical site and procedure, and consent; the surgical site is marked; the pulse oximeter is on the patient and functioning; all members of the team are aware of whether the patient has a known allergy; the patient's airway and risk of aspiration have been evaluated and appropriate equipment and assistance are available; if there is a risk of blood loss of at least 500 ml and appropriate access and fluids are available.

While during the surgery included the following intervention items:

B) Phase two or time out (7 Items): before skin incision, the entire team (nurses, surgeons, anesthesia professionals, and any others participating in the care of the patient) included orally: confirms that all team members have been introduced by name and role, the patient's identity, surgical site, and procedure; reviews the anticipated critical events; surgeon reviews critical and unexpected steps, operative duration, and anticipated blood loss; anesthesia staff review concerns specific to the patient; nursing staff review confirmation of sterility, equipment availability, and other concerns; prophylactic antibiotics have been administered before incision and all essential imaging results for the correct patient are displayed in the operating room. And after surgery (recovery period) as following items:

C) Phase three or sign out (5 Items): before the patient leaves the operating room included: nurse reviews items aloud with the team; name of the procedure as recorded; the needle, sponge, and instrument counts are complete; if any specimen takes; it is correctly labeled, including with the patient's name and the surgeon, nurse, and anesthesia professional review aloud the key concerns for the recovery and care of the patient.

Then transferred patient into ward then followed them to detect presence of any postoperative complications. Also the researchers followed up patient by telephone after the patients discharged from hospital to assess patient for any complication for one month.

Statistical methodology:

The data collected were tabulated & analyzed by SPSS (statistical package for the social science software) statistical package version 20 on IBM compatible computer **(11)**.

Two types of statistics were done:

1) Descriptive statistics: were expressed as mean and standard deviation (X+SD) for quantitative data or number and percentage (No & %) for qualitative data.

2) Analytic statistics:

1- Pearson Chi-square test (χ^2) & Fisher`s Exact Test: It is the test of significance used to study association between two qualitative variables.

2- Student t- test: is a test of significance used for comparison between two independent groups of normally distributed quantitative variables.

P-value at 0.05 was used to determine significance regarding:

- P-value > 0.05 to be statistically insignificant.
- P-value ≤ 0.05 to be statistically significant.
- P-value ≤ 0.001 to be highly statistically significant.

III. Results

Table (1): Socio-Demographic characteristics & Medical data of the studied groups:

Demographic characteristics & medical data	Studied groups				$\chi 2$	P value
	Study group (n=100)		Control group (n=100)			
	NO.	%	NO.	%		
Age (years):						
Mean ±SD	33.58 ± 6.66		33.76 ±7.24		**t- test =**	0.85
Range	22.0 – 48.0		22.0 – 48.0		0.18	NS
Gender:						
▪ Male	46	46.0	52	52.0	0.72	0.39
▪ Female	54	54.0	48	48.0		NS
Type of surgery:						
*Appendectomy	27	27.0	23	23.0	4.69	0.58
*Cholecystectomy	9	9.0	6	6.0		NS
*Mesh hernioplasty	16	16.0	28	28.0		
*Hemorrhoids	15	15.0	13	13.0		
*Amputation of diabetic foot	7	7.0	7	7.0		
*Thyroidectomy	12	12.0	12	12.0		
*Breast mass	14	14**.0**	11	11.0		
Type of anesthesia:						
▪ Spinal	55	55.0	49	49.0	0.72	0.39
▪ General	45	45.0	51	51.0		NS
Underlying disease:						
▪ Yes	45	45.0	47	47.0	0.08	0.77
▪ No	55	55.0	53	53.0		NS
Chronic diseases:						
▪ DM	19	19.0	19	19.0		0.66
▪ HTN	11	11.0	12	12.0	3.22	NS
▪ Cardiac	0	0.0	1	1.0		
▪ Renal	0	0.0	2	2.0		
▪ Hepatic	15	15.0	13	13.0		
▪ No	55	55.0	53	53.0		
Previous surgery:						
▪ Yes	43	43.0	42	42.0	0.02	0.88
▪ No	57	57.0	58	58.0		NS
If had; with/without post-operative complication:						
without complication:						
(A safe surgery)	8	8.0	7	7.0	0.11	0.94
with complication:						
(A harmful surgery)	35	35.0	34	34.0		NS
No previous surgery	57	57.0	59	59.0		
Type of harm:						
▪ Wound infection	21	21.0	20	20.0	0.88	0.83
▪ Allergic reaction	4	4.0	2	2.0		NS
▪ Bleeding	10	10.0	12	12.0		
▪ None	65	65.0	66	66.0		

t test: student t test
$\chi 2$: chi square test
NS: not significant

Table (1) showed that; the mean age of studied sample were (33.58 ± 6.66 & 33.76 ±7.24) in study & control group respectively. More than half of study group (54%) was female, while (52%) was male in control group. In relation to type of type of surgery more than one quarter of study sample had appendectomy; while 28% from control group had hernia repair surgery. Additionally underlying diseases most of studied sample hadn't diseases. About 35% & 34% from study & control group had post-operative complication in the previous surgery; the wound infection was the main post-operative complication during the previous surgery.

Table (2): Phases of Modified World Health Organizational Surgical Checklist application among the studied groups:

Phases of Modified World Health Organizational Surgical Checklist	Studied groups				χ2	P value
	Study group (n=100)		Control group (n=100)			
	NO.	%	NO.	%		
(A) Before induction of anesthesia (sign in)						
(1)Patient has confirmed (identify)						
▪ Not applicable	0	0.0	0	0.0	NA	NA
▪ Yes	100	100.0	100	100.0		
Patient has confirmed (site)						
▪ Not applicable	0	0.0	100	100.0	200.0	<0.001
▪ Yes	100	100.0	0	0.0		HS
Patient has confirmed (procedure)						
▪ Not applicable	0	0.0	0	0.0	NA	NA
▪ Yes	100	100.0	100	100.0		
Patient has confirmed (consent)					146.72	<0.001
▪ Not informed	0	0.0	47	47.0		HS
▪ Informed consent	92	92.0	7	7.0		
▪ Just informed without details	8	8.0	46	46.0		
(2)Site marked:						
▪ Not applicable	20	20.0	87	87.0	90.22	<0.001
▪ Yes	80	80.0	13	13.0		HS
(3) Anesthesia safety check completed						0.003
▪ Not applicable	4	4.0	17	17.0	8.99	S
▪ Yes	96	96.0	83	83.0		
(4) Pulse oximeter on patient and functioning						
▪ Not applicable	0	0.0	0	0.0	NA	NA
▪ Yes	100	100.0	100	100.0		
(5.1) Identify patient has allergy:						
▪ No	0	0.0	0	0.0	NA	NA
▪ Yes	100	100.0	100	100.0		
(5.2) Identify patient has difficult airway/aspiration risk						<0.001
▪ No	6	6.0	45	45.0	40.03	HS
▪ Yes	94	94.0	55	55.0		
(5.2) If difficult airway/aspiration risk						
▪ Equipment/assistance available	94	94.0	47	47.0	53.10	<0.001
▪ Not equipment/assistance available	6	6.0	53	53.0		HS
(5.3) risk of >500ml blood loss						
▪ No	3	3.0	15	15.0	8.79	0.003
▪ Yes	97	97.0	85	85.0		S
(5.3) If yes (risk of >500ml blood loss)					31.86	<0.001
▪ Adequate intravenous access and fluids planned	97	97.0	66	66.0		HS
▪ Not adequate intravenous access and fluids planned	3	3.0	34	34.0		

Table (2) explored that; by application of modified World Health Organizational Surgical Checklist in period of (Before induction of anesthesia (sign in); there was a statistical significant difference between both groups regarding all characters modified World Health Organizational Surgical Checklist except patient has confirmed (identify), Patient has confirmed the procedure, Pulse oximeter on patient and functioning and patient has allergy.

Continuous Table (2): Modified World Health Organizational Surgical Checklist among the studied groups:

Modified World Health Organizational Surgical Checklist	Studied groups				$\chi 2$	P value
	Study group (n=100)		Control group (n=100)			
	NO.	%	NO.	%		
(B) Before skin incision (time out)						
(6) Confirm all team members have introduced themselves by name and role surgeon, anesthesia professional and nurse verbally confirm - Patient					158.81	<0.001 HS
▪ Not applicable	3	3.0	92	92.0		
▪ Yes	97	97.0	8	8.0		
-Site						
▪ Not applicable	3	3.0	92	92.0	158.81	<0.001 HS
▪ Yes	97	97.0	8	8.0		
-Procedure						
▪ Not applicable	3	3.0	92	92.0	158.81	<0.001 HS
▪ Yes	97	97.0	8	8.0		
(7.1) What are the Critical or unexpected steps, operative duration, anticipated blood loss?					30.48	<0.001 HS
▪ Not applicable	3	3.0	33	33.0		
▪ Yes	97	97.0	67	67.0		
(7.2) Anesthesia team reviews: are there any patient-specific concerns?					30.48	<0.001 HS
▪ Not applicable	3	3.0	33	33.0		
▪ Yes	97	97.0	67	67.0		
(7.3) Nursing team reviews: has sterility (including indicator results) been confirmed? Are there equipment issues or any concerns?					21.12	<0.001 HS
▪ Not applicable	7	7.0	33	33.0		
▪ Yes	93	93.0	67	67.0		
(8) Has antibiotic prophylaxis been given within the last 60 minutes?					30.48	<0.001 HS
▪ Not applicable	3	3.0	33	33.0		
▪ Yes	97	97.0	67	67.0		
(9) Is essential imaging displayed?					30.48	<0.001 HS
▪ Not applicable	3	3.0	33	33.0		
▪ Yes	97	97.0	67	67.0		
(C) Before patient leaves operating room (sign out)						
(10) Nurse verbally confirms with the team: (10.1) the name of the procedure recorded					116.71	<0.001 HS
▪ Not applicable	3	3.0	78	78.0		
▪ Yes	97	97.0	22	22.0		
(10.2) instrument, sponge and needle counts correct					12.76	<0.001 HS
▪ Not applicable	0	0.0	12	12.0		
▪ Yes	100	100.0	88	88.0		
(10.3) how specimen labeled (including patient name)					153.98	<0.001 HS
▪ Not applicable	0	0.0	87	87.0		
▪ Yes	100	100.0	13	13.0		
(10.4) whether there are any equipment problems to be addressed					153.98	<0.001 HS
▪ Not applicable	0	0.0	87	87.0		
▪ Yes	100	100.0	13	13.0		
(11) Surgeon, anesthesia professional and nurse review the key concerns for recovery and management of this patient					141.05	<0.001 HS
▪ applicable properly	80	80.0	0	0.0		
▪ applicable improperly	20	20.0	56	56.0		
▪ not applicable	0	0.0	44	44.0		

Table (2) illustrated that; there was a statistical significant difference between both groups regarding all characters modified World Health Organizational Surgical in period of (Before skin incision (time out) and (Before patient leaves operating room (sign out), by application of modified World Health Organizational Surgical Checklist.

Figure (1): Postoperative complication among the studied groups:

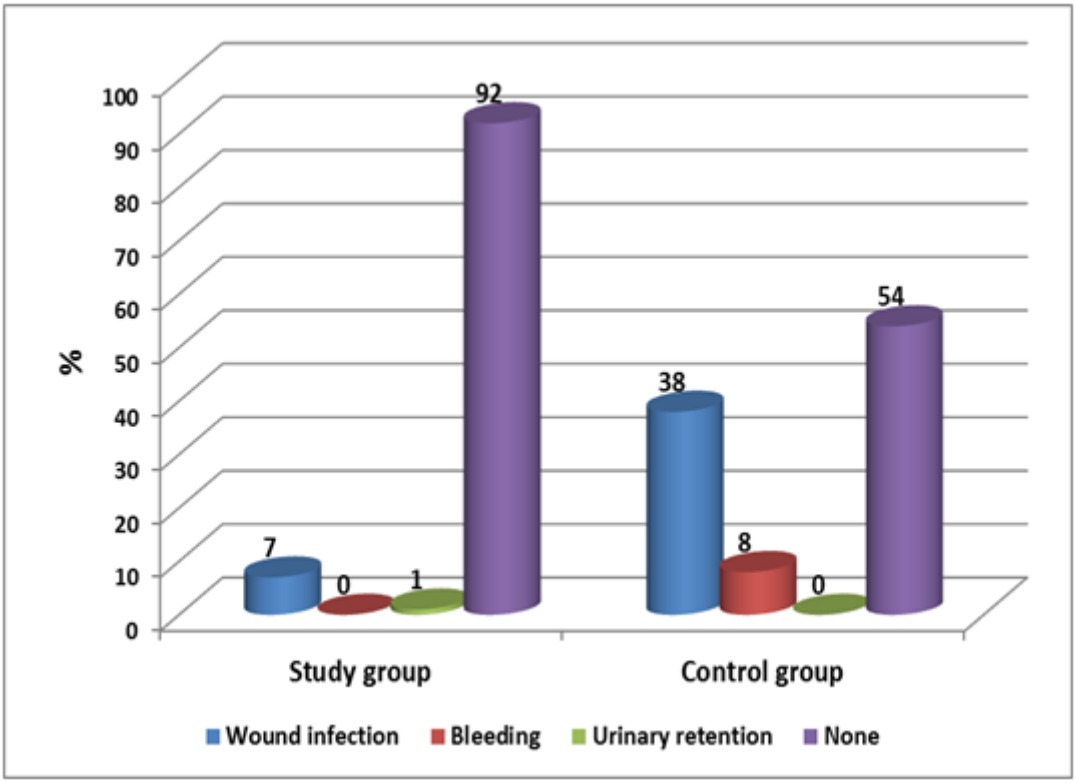

Figure (1) showed that; most of patients in study group hadn't any postoperative complications studied sample (92%) .while 54% of patients in control sample hadn't postoperative complications,. Also there was a highly statistical significant difference between both groups regarding postoperative complications.

Table (3): Association between presence of complications among study group and their Socio-Demographic characteristics:

Demographic characteristics & medical data	Studied groups				χ2	P value
	Presence of complications (n=8)		Free from complications (n=92)			
	NO.	%	NO.	%		
Age (years): Mean ± SD	39.13 ± 6.89		33.10 ±6.46		**t- test =** 2.51	0.01 S
Gender:						
Male	4	50.0	42	45.7	0.05	1.0*
Female	4	50.0	50	54.3		NS
Type of surgery:						
Appendectomy	0	0.0	27	29.3	9.24	0.16
Cholecystectomy	1	12.5	8	8.7		NS
Mesh hernioplasty	2	25.0	14	15.2		
Hemorrhoids	1	12.5	14	15.2		
Amputation of diabetic foot	1	12.5	6	6.5		
Thyroidectomy	3	37.5	9	9.8		
Breast mass	0	0.0	14	15.2		
Type of anesthesia:						
▪ Spinal	3	37.5	52	56.5	1.07	0.46*
▪ General	5	62.5	40	43.5		NS

Underlying disease:						
▪ No	3	37.5	52	56.5	1.07	0.46*
▪ Yes	5	62.5	40	43.5		NS
Chronic diseases:						
▪ DM	5	62.5	14	15.2		0.01
▪ HTN	0	0.0	11	12.0	11.40	S
▪ Hepatic	0	0.0	15	16.3		
▪ No	3	37.5	52	56.5		
Previous surgery:						
▪ No	3	37.5	54	58.7	1.34	0.28*
▪ Yes	5	62.5	38	41.3		NS
If had it was:						
▪ A safe surgery	1	12.5	7	7.6	1.35	0.50
▪ A harmful	4	50.0	31	33.7		NS
surgery	3	37.5	54	58.7		
▪ No previous						
surgery						
Type of harm:						
▪ Postoperative	3	37.5	18	19.6		
fever	1	12.5	3	3.3	3.86	0.27
▪ Infected wound	0	0.0	10	10.9		NS
discharge	4	50.0	61	66.3		
▪ Bleeding						
▪ None						

*Fishers` exact test

Table (3) revealed that; there was a statistical significant association between presence of complications in study group and age, presence of chronic diseases.

IV. Discussion

By directing thoughtfulness on surgery as a public health concern, the WHO knows the significance of improving the safety for patients undergoing any surgical intervention worldwide. Application of Surgical Checklist through three phases (before induction of anesthesia; after induction and before surgical incision, entire team and during or immediately after wound closure, before moving the patient out of the operating room, while the surgeon still present; all these items ensure the patient's safety and decline postoperative complications. **Aim of the study:** to evaluate the effect of World Health Organizational Surgical Checklist Application on Patients' Safety and Postoperative Complications.

4.1 As regards to Socio-Demographic characteristics and medical data:

The current study stated that; the most common performed surgery among studying group and control group were appendectomy and mesh hernioplasty (hernia repair) respectively; this result supported with **Marco Ceresoli; et al** (2016) [12] and **Waleed Yusif El Sherpiny** (2020) [13]; they documented that; appendectomy as an emergency surgical intervention for acute appendicitis; and mesh hernioplasty are of the most common surgical procedures of the abdomen that notified by general surgeon.

4.2 Phases of Modified World Health Organizational Surgical Checklist application.

4.2.1 **(Phase one) before induction of anesthesia (sign in):**

The present study documented that; there was a statistical significance difference between both groups in many items of Modified World Health Organizational Surgical Checklist application in phase one; which is a very important for maintaining surgical patient's safety as informed patient consent, marked of operation site; efficient assessment and a proper examination for airway difficulty and risk of >500ml blood loss; all these are preventable factors for patients harm and very essential components of patients safety; otherwise they are essential factors in reducing postoperative complications. All these items are needed for patient's safety. This result in line with; **Birhanemeskel Tegene Adankie et al. (2017)** [14] they reported that; surgical checklist focus on numerous greatest serious components of patient's safety as safe anesthesia and airway function, marked correct surgical site.

4.2.2 **(Phase two) before skin incision (time out)**:

The present study documented that; in phase two; there was a statistical significance difference between both groups in all items of Modified World Health Organizational Surgical Checklist application as team introduction by name and role; verbal confirmation of patient, site and procedure immediately before incision with all team members present; discussion of specifics of case including operative duration, patient comorbidities, and other critical issues additional sterility indicators. All these items are needed for patient's safety. This result agreed with **Natasha Woodman and Isabeau Walker** (2016) [15] they clarified that; during

surgery a proper communication among surgical team is very important; reviewing the sterility to prevent incidence of infection occurs after surgery indicated by fever and wound infected discharges, and review the number of package of pads, gauze, needles and instruments are an important recurring adverse event worldwide and maintaining patient's safety.

4.2.3 **(Phase three) before patient leaves operating room (sign out):**

The current study documented that; in phase three; there was a statistical significance difference between both groups in all items of Modified World Health Organizational Surgical Checklist application as team confirm operation performed and recorded; check number for surgical instruments, sponge/swab and needle and express plans for recovery especially high risk patients. All these items are needed for patient's safety. This result supported by **Natasha Woodman and Isabeau Walker** (2016) **(15)** who documented that; it is very essential to verbalize counting the number of all instruments, needles, pads before sign out; it is better use of standardized packs and lists of instruments help the counting process for maintaining patient's safety.

4.3 Relation to Postoperative complications:

The present study documented that; there was a statistical significant difference between both groups regarding postoperative complications by the effect of Modified World Health Organizational Surgical Checklist application; which included all the components focused on maintaining patient's safety and reducing postoperative complications as fever and wound infection. This result agreed with **Birhanemeskel Tegene Adankie et al (2017) (14)** who stated that reducing in the frequency of fever and surgical wound infection among the checklist group.

4.4 Regarding to presence of association between postoperative complications and Socio-Demographic characteristics among study group:

The existent study documented that; presence of a strong association between the incidence of postoperative complications and patient's age; this result was identical with **Anwar, et al (2019) (16);** they reported that; the rate of postoperative complications increasing by age as independent factor. Furthermore **Tomoaki, et al (2016) (17),** stated that; all diabetic, renal, cardiac, hypertensive and hepatic patients more high risk to postoperative complications.

V. Conclusion

Application of WHO surgical checklist for patients undergoing any type of surgical procedures considered a successful method for lowering harm and improving patients' safety.

VI. Recommendation

Based on results of current study, the researchers recommended that; the surgical checklist must be become a part of routine surgical care to reduce harm, postoperative complications and enhance patients' safety**.**

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