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Application Of Surgical Safety Checklist (WHO) at Al-Yarmouk Teaching hospital

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***ABSTRACT**--Surgery-related complications are quite common and often avoidable. We aimed to verify the usefulness of a 19-item Surgical Safety Checklist, based on WHO guidelines, to reduce the rate of complications and deaths associated with non-cardiac surgery.Over a one-year period, a total of 162 patients scheduled for various non-cardiac surgical operations were included in the study. Patients were followed up for up to 30 days after surgical intervention.Using the 19-item surgical safety checklist, the risk of surgical site infection (SSI), respiratory complications, missed gauze, and blood loss requiring transfusion were comparable to UIC results of the World Health Organization (3.7%, 2.4%, 0.69 and 1.85%, respectively). Pulse oximeter was used in 92.5% and site marking in 65.4%. Antibiotic prophylaxis was used in 61.7% of patients in which just 3.7% developed SSI, while the extended regimen used in 38.3% of patients resulted in SSI rate of 9.8%. No mortality was reported during the period of the study.The Surgical Safety Checklist is a simple cheap and effective method to reduce surgical complications in daily clinical practice. We recommend the use of the Surgical Checklist in all operations with modifications made for different surgical specialties.*

***Keywords**-- Application Of Surgical Safety Checklist (WHO) at Al-Yarmouk Teaching hospital*

I. INTRODUCTION

Approximately 234 million major surgical operations are performed every year.[i] Surgery has high rates of morbidity and mortality. At least 7 million people each year experience disabling surgical complications including more than one million deaths.[ii,iii] With these alarming rates of surgical complications, it was clear that effective, practical, and standardized methods were needed to minimize these risks.

The WHO Patient Safety, launched in 2004, brought for the first time, heads of agencies, policy-makers and patient groups from around the world to come together to advance attainment of the goal of "First, do no harm" and to reduce the adverse consequences of unsafe health care.[iv] In 2008, the WHO Patient Safety started the global program of Safe Surgery Saves Lives which identified 10 essential elements for safe surgery: [v]

(1) The team will operate on the correct patient at the correct site.

(2) The team will use methods known to prevent harm from administration of anesthetic, while protecting the patient from pain.

(3) The team will recognize and effectively prepare for life threatening loss of airway or respiratory function.

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(4) The team will recognize and effectively prepare for risk of high blood loss.

(5) The team will avoid inducing an allergic or adverse drug reaction for which the patient is known to be at significant risk.

(6) The Team will consistently use methods known to minimize the risk for surgical site infection.

(7) The team will prevent inadvertent retention of instruments and Sponges in surgical wounds.

(8) The team will secure and accurate identify all surgical specimens.

(9) The team will effectively communicate and exchange critical information for the safe conduct of the operation.

(10) Hospitals and public health systems will establish routine surveillance of surgical capacity, volume and results.

Between October 2007 and September 2008, the Safe Surgery Saves Lives Study Group, funded by the World Health Organization (WHO), conducted a large study to confirm the usefulness of a 19-item Surgical Safety Checklist (Figure 1) based on the WHO guidelines for safe surgery.[4,vi] The study was conducted in 8 different hospitals in 8 different countries in order to include a wide range of economies, patient populations and health care settings. The checklist identifies three phases of an operation, each corresponding to a specific period in the normal flow of work: before the induction of anesthesia ("sign in"), before the incision of the skin ("time out") and before the patient leaves the operating room ("sign out").

Although the WHO surgical safety checklist is now adopted world-wide[vii], some surgical teams still do not routinely employ it in every case. We did this study to check for the adherence to checklist and to encourage our colleagues to adopt it by emphasizing its clear benefits in reducing morbidity and mortality.

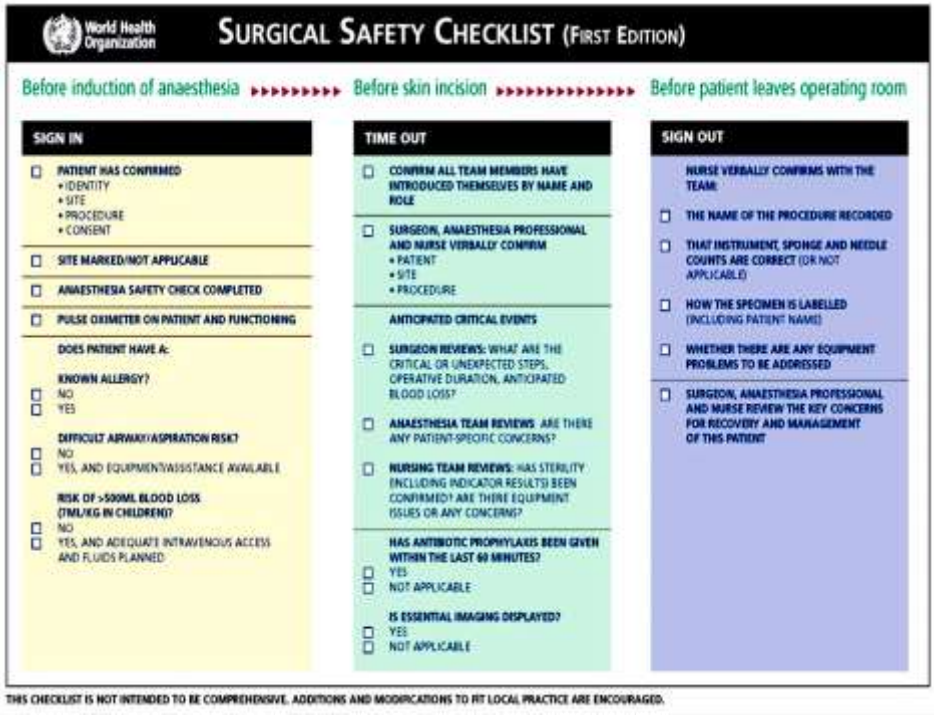

Figure 1: WHO Surgical Safety Checklist [4].

II. PATIENTS AND METHODS

We prospectively collected clinical data and outcomes of 162 consecutive patients who had surgery during one-year period (1st of Aug 2009 to 1st of Aug 2010). We checked for the adherence to the 19-items WHO checklist in Arabic and English (Fig. 1) with the help of the resident doctors in collaboration with the anesthetist and nursing staff of the surgical theater in Al Yarmouk Teaching Hospital in Baghdad-Iraq.

The surgical interventions included both elective and emergency cases. The primary end points were the rate of complications, including surgical site infection, respiratory problems and death, during hospitalization or within the first 30 days after the index operation.

The 19 parameters of the checklist were divided into three phases. Phase I: before induction of anesthesia, consists of identity, site, procedure, consent, marking the site of operation, pulse oximetry, check of anesthetic machine and its drugs, allergy to drugs, risk of difficult airway and risk of blood loss. Phase II: before skin incision, consists of introduction of the staff members in the theater, verbal confirmation of name, site, and type of the procedure. In addition, it contains the anticipated critical event during surgery, antibiotic prophylaxis, and imaging displayed. Phase III: before patient leaves operation room, the list consists of name of the procedure, instruments, gauze count, how the specimen labeled, any equipment

problem, any concern regarding the recovery and the management of these patients. Thereafter we followed up the patients for any postoperative complications up to 30 days.

III. RESULTS

The study included 162 patients, 89 females (55%) and 73 males (45%), with age of 31 ± 14.4 years.

In phase I, before induction of anesthesia (table 1), the identity of the patient was checked in 161 (99.38%) patients, the site in 160 (98.76%) patients, type of procedure in 150 (92.59%) patients and the consent in 152 (93.83%) patients. The site for operation was marked in 106 (65.43%) patients. The pulse oximetry used in the Inger of the patients in 150 (92.59%) patients. Anesthesia safety Checked 155 (95.68%) patients. Allergy to drugs checked in158 (97.53%) patients, 9 (5.56%) had drug allergy. Difficulty in airway checked for in 158 (97.53%) patients, 2 (1.23%) of them had airway difficulty. Risk of blood loss checked for in 153 (94.44%) patients, of those 5.56% had risk of blood loss and preparation was done.

In phase II, before skin incision (table 2), the nurse confirmed the name of the patient, site and type of procedure in l6l (99. 38%) patients. Anticipated critical events were the surgeon asked for how long the duration of operation or if there is risk of blood loss in 78 (48.15%) patients. The anesthetist asked for any patient specific concerns in 19 (48.76%) and the nursing team review in 16 (9.88%). Antibiotic prophylaxis given in 100 (61.73%) patients, and extended regimen in 62 (38.27%) and the imaging displayed in 65 (40.12%) patients.

In phase III, before the patient leave the operative room (table 3), the nurse verbally confirmed the name of the procedure in 160 (98.76%) patients, instruments and gauze count in 120 (74.07%) patients, specimen labeling in 93 (57.41%) patients and equipment problems in 20 (12.34%) patients. The anesthetist communicated the concerns for the recovery of the patients in 123 (75.92%) cases

During the follow up period (Table 4), 22 (13.58%) patients developed surgical site infection, of whom 6 (3.7%) received antibiotic prophylaxis, within one hour before operation and two other doses post operatively, and 16 (9.88%) continued on extended regimen. The number of patients with no wound infection who received

extended regimen was 46 (28.39%), and those who received antibiotic prophylaxis with no infection were 94 (58.02%), (P = 0.0003).

Table 5 shows the complications that occurred during and after completion of surgery, airway difficulties in 2 (1.23%), respiratory infection occurred in 4 (2.47%) patients. Five (30.85%) patients needed blood transfusion postoperatively, surgical site infection occurred in 22 (13.58%) and missed gauze happened in 1 (0.62%) case.

Table 6 shows the characteristic of the procedure with respect to the results and the regimen of antibiotic prophylaxis. In the 49 (30.25%) patients who had emergency operations, surgical site infection occurred in 15 (9.26%) cases, antibiotic prophylaxis was given in 20 (12.35%), the extended regimen in 29 (17.99%) and pneumonia occurred in 1(0.62%) patient.

In the 113 (69.75%) patients who had elective surgery, surgical site infection occurred in 7 (4.32%) cases, antibiotic prophylaxis was given in 80 (49.38%) patients, and extended regimen of antibiotics used in 33 (20.37%) patients, airway difficulties encountered in 2 (1.23%) and respiratory complications in 3 (1.85%) cases. No mortality occurred in either group. Four (2.4%) patients who had outpatient procedures were excluded from the study.

Table 1: Number of patients checked before induction of anesthesia (n=162)

Parameters	No. of patients Checked	%
Identity	161	99.38
Site	160	98.76
Consent	152	93.83
Procedure	150	92.59
Site marked	106	65.43
Pulse oximeter	150	92.59
Anesthetic safety check	155	95.68
Drug allergy	158	97.53
Airway difficulty	158	97.53
Risk of blood loss	153	94.44

Table 2: Number of patients checked before skin incision (N=162)

Parameters	No. of patients	%
Nurse confirmation	161	99.38
Anticipated critical	78	48.15

Events	79	48.76
	16	9.88
Antibiotic prophylaxis	100	61.73
Imaging displayed	65	40.12

Table 3: Number of patients checked before patient leaving operative room (N=162)

Parameters	No. of patients	%
Name of procedure	160	98.76
Instruments & gauze count	120	74.07
Specimen labeling	93	57.41
Equipment problems	20	12.34
Review of recovery concerns	123	75.92

Table 4: Relation of SSI to the prophylactic antibiotic or to extended regimen (N=162)

Parameter	Antibiotic prophylaxis	Extended regimen
Surgical site infection	6 (3.7%)	16 (9.88%)
No infection	94 (58.02%)	46 (28.39%)
Total number	100 (61.73%)	62 (38.27%)

Table 6: Elective and emergency cases with respect to complications and regimen of antibiotics. (n=162)

Parameters, n (%)	Antibiotic prophylaxis	Extended regimen	Airway difficulty	Respiratory complications
Emergency cases 49 (30.25%)	15 (9.26%)	20 (12.35%)	0 (0%)	1 (0.62%)
Elective cases 113 (69.75%)	7 (4.32%)	80 (49.38%)	2 (1.23%)	3 (1.85%)
P value	0.0001	0.0003		0.817

IV. DISCUSSION

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Surgical complications are a significant cause of death and disability around the world. They are devastating to patients, costly to health care systems, and often preventable, though their prevention typically requires a change in systems and individual behavior. The introduction of the WHO Surgical Safety Checklist into operating rooms in our hospital was comparable in surgical results with Haynes et al.[6]

The low rate of 3.7% for surgical site infection in our study is nearly the same as that found in the landmark study by Haynes et al (3.4%).[6] This rate was much higher (16.4%) using the old extended antibiotic regimens as shown by a previous study in our hospital.[viii] This clearly shows the effectiveness of giving antibiotics within one hour before skin incision as recommended by current guidelines.[ix]

In this study, although not all the patients had the site of the surgery marked but there was no wrong site surgery during our collection of patients. This is possibly related to the small number of patients studied or to verbal confirmation of the site of the procedure. In contrast, a recent review of the Research and Learning Service (RLS) database, which represents the largest database of patient safety incidents in the UK, there were 26 cases of "wrong patients" representing 3.6% of all wrong site/side, wrong procedure/patient adverse events (WSPEs) over a period of one year (Sep 2007- Aug 2008).[x] In another large study involving multiple patient databases in the United States in 2006, there were 5940 cases of WSPEs recorded over a period of 13 years [xi], putting in mind that this likely to be an underestimate.[xii]

The development of pneumonia as a respiratory complication in this study occurred in 4 (2.47%) patients, 2 of them were possibly related to inappropriate intra-operative airway management, inappropriate pre-operative preparation, and lack of precise monitoring by the anesthetist assistant. While this is almost double the rate reported in the landmark study by Haynes et al (1.3%) [6], it is much lower than the rate reported in other studies such as that by Jawaid et al (7.0%) performed in a similar setting of teaching government hospital.[xiii]

In our study, gauze and instrument counting were done only in 120 (74.07%) operations, as the nurse counted them only when there is open cavities, but one patient (0.02% or 1/5000 operations) had gauze missed in subcutaneous tissue and this happened due to non-counting of some gauze that was missed at the end of operation. This figure is within the reported literature for retained foreign bodies after surgery of 1/1000 to 1/18000 operations.[xiv,xv] Surprisingly, a major study in Mayo Clinic found that 59% of retained foreign objects were found unexpectedly on postoperative x-rays despite the fact that the sponge, instrument, and needle counts were reported as correct at the end of the operation.[xvi] This made the authors conclude that a "correct" gauze and instrument counts is a not a reliable safeguard against missed objects after surgery.

No postoperaive mortality was reported in our study. This compares to a rate of 0.8% in the landmark study by Haynes et al and to 0.9% in the study of Jawaid et al. This is likely related to the relatively small number of patients in our study, most being elective cases with adequate preoperative preparation. The few emergency cases were of short duration with minimal risk of bleeding or other complications, in addition to the application of the checklist and good preoperative preparation.

In the four outpatient procedures (2.4%), there was incomplete collection of outcome data as the follow up ceased on discharge from the hospital on the day of the procedure, but their small number were unlikely to affect the total rates calculated.

A major limitation of our study is the relatively small number of operations over the study period which may have led to an underestimation of the rate of complications or overestimation of the rate of adherence to the WHO

surgical safety checklist. There was some difficulty in assigning the role of checklist coordinator. We also faced variable response to the application of the checklist among the medical staff as they think they are being watched or that the checklist causes unnecessary prolongation of procedure time. Finally, this checklist practice has the potential to prevent patients' deaths and complications.

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