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Compliance of general surgeons with Safe Surgery in a General Navy Hospital, Alexandria, Egypt

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ABSTRACT

Background: Surgical care is an integral part of health care throughout the world; and is gaining attention from the public health community worldwide. **Objectives:** This study was conducted to assess compliance and attitudes of the surgeons in the General Navy Hospital toward safe surgery. **Methods**: Fifty-five general surgical operations, performed in the 3 main operation rooms of the Anesthesia and Operations Department of study hospital were observed to assess the compliance of the operating 11 general surgeons to the WHO safe surgery checklist starting from 15 March 2010 and for three weeks. Five observations were done for each surgeon. WHO checklist divides the operation into three phases namely sign in, time out and sign out, each corresponding to a specific time period in the normal flow of a procedure. All safety practices and steps were weighted equally such that a team was given 1 point for compliance with a practice or process and 0 point for noncompliance and scores could range from 0% to 100%. In order to assess how the safe surgery checklist was perceived, the same 11 general surgeons were interviewed with a structured questionnaire. **Results**: The least aggregate surgeons' compliance was in completing the safety practices comprising 'time out' phase; 56.4% (31 times out of the 55 surgeries). The highest aggregate surgeons' compliance was in completing the safety practices comprising 'sign in' phase was 65.5% (36 times out of the 55 surgeries). While, the aggregate compliance score of the 'sign out' phase was 67.3% (37 times out of the 55 surgeries), and that the overall aggregate compliance score for completing the 19 safety practices comprising the safe surgery checklist was 52.7% (29 surgeries out of the 55 surgeries).Regarding surgeons' attitude to safety practices items, none of the items was rated to be definitely 'of no importance'. **Conclusion and Recommendations**: Hospitals should consider implementing operating room briefings as a strategy to improve operating room efficiency and clinical and economic outcomes in surgical patients. Surgeons must be committed to the common goals of patient safety to ensure safe surgery.

Keywords: Attitude- Compliance- Safe surgery

INTRODUCTION

Surgical care is an integral part of health care throughout the world, and gaining attention from the public health community worldwide. Surgical care is associated with a considerable risk of complications and death. In industrialized countries, the preoperative rate of death from inpatient surgery is 0.4 to 0.8% and the rate of major complications is 3 to 17%. These rates are

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likely to be much higher in developing countries. [1]

In July 2004, the Joint Commission on Accreditation of Healthcare Organizations mandated the Universal Protocol for the prevention of wrong-site, wrong-side, wrong-procedure and wrong-person surgery for all Joint Commission-accredited organizations. The protocol consists of guidelines for a preoperative verification process, marking of the operative site and a 'time out' immediately before start of the procedure. [2] In 2008, the World Health Organization (WHO) published guidelines identifying multiple recommended practices to ensure the safety of surgical patients worldwide. [1] The WHO surgical safety checklist was also launched in 2008 as a second global safety challenge, "Safe surgery saves lives". It considered as a core surgical safety principles to keep common problems in the front of everyone's mind.[3] WHO surgical safety checklist was implemented at the General Navy Hospital in 2009. The safe surgery checklist (Arabic version)[4] and its manual (Arabic version)[5] were distributed to all staff of Surgical and Anesthesia Departments and an abridged version of the copy was pasted in every operation room. All involved personnel were oriented and trained about the safety checklist. The training was in the form of lectures, case studies, role playing and practical teaching sessions. So this study was conducted to assess compliance of surgeons in General Surgery Department with World Health Organization (WHO) checklist. Also, the study aimed to assess the attitudes of the surgeons (the leaders of the surgical team) towards safe surgery.

MATERIAL AND METHODS

Study Setting

This study was conducted in a General Navy Hospital; 150-bed secondary level Military Hospital, Alexandria, Egypt.

Study Design

Descriptive cross sectional study

Target Population

All surgeons working in the General Surgery Department in the study hospital.

Sampling Design and sample size

All surgeons in the General Surgery Department were involved. They were 11 surgeons. The study was conducted in the General Surgery Department because this department involves the largest number of surgeons, who are subsequently performing the biggest number of surgeries per week (mean of 61 surgeries; 42- 85). A List of names of surgeons was done to construct sampling frame and one or two surgeons were selected randomly to be observed each time. Each surgeon was observed for compliance with the checklist in 5 successive surgeries. The total observations made were 55 surgeries for the 11 studied general surgeons.

Sample Size: Sample size was determined after reviewing the literature and following the methodology adopted by France et al (2008). [6] The sample size was calculated by using the **MedCalc** software version 8.1: if the null hypothesis value is 50%, and we consider a proportion of at least 70% to be significantly different and the **α** level of 0.05 and β level of 0.20; the required sample is 47 cases (4.27 cases for each surgeon). Accordingly, 5 cases (operations) were observed for each surgeon.

Data Collection techniques and tools

The data was collected through observation and interview using observation checklist and structured interview questionnaire.

I- Observation checklist:

The researcher observed 55 general surgical operations performed in the three main operation rooms in the Anesthesia and Operation Department in the study hospital. The researcher used a standardized verification compliance checklist to record the surgeons'

compliance to the WHO checklist. The verification checklist was developed by itemizing the elements of WHO Surgical Safety checklist.

The Checklist divides the operation into three phases namely sign in, time out and sign out. Each phase corresponds to a specific time period in the normal flow of a procedure. It included 19 Safety items correlates to those of the WHO safe surgery checklist.[4]

***First phase* (7 items):** It corresponds to 'Sign in' protocol (before induction of anesthesia) and includes the following items:

Item 1: Confirmation of patient's identity, procedure planned, site of surgery, consent for surgery given.

Item 2: Confirmation that the surgeon marked the site of surgery.

Item 3: Completion of an anesthesia safety check**.**

Item 4: Confirmation that a functioning pulse oximeter is placed on the patient**.**

Item 5: Verbal confirmation whether the patient has a known allergy**.**

Item 6: Anesthesia team has assessed whether the patient has a difficult airway**.**

Item 7: Confirmation patient's risks losing >500 ml blood during surgery**.**

***Second phase* (7 items):** It corresponds to 'Time out' protocol (before skin incision) and includes the following items:

Item 8: All team members introduced themselves by name and role**.**

Item 9: Confirmation of patient's name, surgery performed, site of surgery and, positioning of patient**.**

Item 10: Prophylactic antibiotics were given during the previous 60 minutes.

Item 11: Asking each team member about any anticipated critical events.

Item 12: Discussion with surgeon: to identify critical or non-routine steps? And discussion with anesthetist: about any patient-specific concerns?**.**

Item 13: Confirmation: that sterilization is successfully performed (indicator)**.**

Item 14: Confirmation that essential imaging is in the room and prominently displayed**.**

***Third phase* (5 items)**: It corresponds to 'Sign out' protocol (before the patient leaves the operating room) and includes the following items:

Item 15: Confirmation of the team that the exact procedure done**.**

Item 16: Confirm the completeness of final sponge and needle counts**.**

Item 17: confirmation that correct labeling of any pathological specimen.

Item 18: equipment problems arising are identified by the team**.**

Item 19: Review the post-operative recovery and management plan. All observations and data collection started at the time the patient entered the operating room before the start of the case and ended at the time the attending surgeon left the operating room at the end of the case.

Pilot: Before starting the study, the investigators observed 3 surgical operations to guide the development of the data collection tool (i.e., compliance checklist) and an additional 3 cases after tool development to evaluate its efficacy. The results of pilot were excluded from the results of the study.

Scoring:

The researchers calculated team compliance scores for each surgical case observed. All safety practices and steps were weighted equally such that a team was given 1 point for compliance with a practice or process and 0 points for noncompliance. Scores could range from 0% to 100%.Mean score percent was calculated by dividing actual score on maximum score and multiplied by one hundred.

II- Interview questionnaire:

After observation of the 55 study surgeries, the 11 general surgeons were interviewed (all agreed to participate in the study) using a structured questionnaire.

This questionnaire was based on literature review with permission of the author.[6] The survey included the qualification of the surgeon, and his years of experience, in addition to four main questions [6] covering the main topics of safe surgery with yes or no response.

The respondents were also asked to grade the different aspects of WHO Surgical Safety Checklist for time out and sign out phases in order of their importance in contributing to an increased patient safety. The possible answers were very important, important to some degree, probably not important and definitely of no importance.[7]

Statistical Analysis

The study started from 15 March 2010 and for three weeks. All the collected data was tabulated and statistically analyzed using SPSS (Statistical Package for the Social Sciences) version 11. Descriptive statistics were done for all variables. Mean and standard deviation was done for all scores (numerical data), and frequencies were done for non-numerical data. Comparison between scores was done by the *t-test*. Correlation with *Pearson correlation coefficient* was used to correlate overall performance versus experience.

Ethical consideration:

- Anonymity and confidentiality of participants were ensured throughout the study.
- The purpose of the study was explained.
- Oral consent from the participants was granted before participating in the study.

RESULTS

The majority of surgeons 9 (82%) have a master degree in surgery, only 2 (18%) surgeons are qualified with a doctorate degree in surgery. Years of experience of the study surgeons ranged between 3 and 23 years with a mean value of 14.3±6.9 years.

Surgeons' compliance with safe surgery practices*: the surgeons' role is more apparent in the second and third phases of the checklist (time out and sign out phases).*

Table (1) shows mean score percent of compliance with 19 safety items of the WHO safe surgery checklist in the Anesthesia and Operation Department of the study hospital during the study period. The mean scores percent of compliance with check list items of sign in phase were 100% for 3 items out of 7 items (60% of items) namely confirmation of patient's identity, procedure planned, site of surgery, consent for surgery given, confirmation that the surgeon marked the site of surgery and confirmation that a functioning pulse oximeter is placed on the patient. Concerning time out phase, the compliance scores were 100% only for 2 items out of 7 items i.e.28.5% of items namely confirmation that prophylactic antibiotics were given during the previous 60 minutes and confirmation that sterilization was successfully performed. Surgeons scored the lowest compliance score (60%) for Item 8 namely all team members introduced themselves by name and role). Surgeons achieved high compliance scores with 'Sign out' with its 5 subcomponents. Surgeons scored a 100% compliance score for 3 items (60% of items) namely confirmation the completeness of final sponge and needle counts; confirmation correct labeling of any pathological specimen, and equipment problems arising are identified by the team. The Surgeons scored a lower compliance score (81.8%) for the confirmation of the team the exact procedure done and for the review the post-operative recovery and management plan.

Table 2 illustrates the observed surgeries with full compliance to all items of each phase of safe surgery checklist. The overall aggregate compliance for completing the 19 safety practices comprising the safe surgery

checklist was 52.7% which represents 29 observed surgeries out of the 55 surgeries. The least aggregate surgeons' compliance was in completing the safety practices comprising 'time out' phase; 56.4% (31 surgeries out of the 55 surgeries). The highest aggregate surgeons' compliance was in completing the safety practices comprising 'sign out' phase was 67.3% (37 surgeries out of the 55 surgeries). While in 'sign in' phase; it was 65.5% (36 surgeries out of the 55 surgeries).

Table (3) demonstrates the overall compliance score percent of the surgeons compared to surgeons' qualification. The mean score percent for surgeons with master degree (92.87±7.3) were higher than that of surgeons qualified with a doctorate degree (80.5±0.7). This difference was statistically significant *(**t-test** 2.295, **P**= 0.047, **P<0.05**).*

Table (4) shows the overall compliance correlated to the surgeons' years of experience. Negative correlation was observed as the Pearson correlation was – 0.160. This negative correlation was statistically not significant *(**P**= 0.639).*

Surgeons' attitude to safety practices

Figure (1) presents response of the general surgeons to the importance of 'time out' as a tool for improving patient safety. Attitudes to confirmation of patient identity, and correct side were considered 'very important' by 100% of the responders. Review of potential critical moments, checking that antibiotic prophylaxis had been given and checking of allergies or contagious diseases were considered 'very important' by 91% of the responders, the remaining 9% considered it as 'important to some degree'. Correct procedure and checking of patient positioning were rated somewhat lower, as only 72.7% of the responders considered them 'very important', the remaining 27.3% considered it as 'important to some degree'. Attitudes to self-introduction by team members before starting surgery showed the least rating, as

only 36% of the responders considered it to be ‘very important’, 45.5% considered it to be 'important to some degree', and 18.2% considered it to be ‘probably without importance’. None of the items was rated to be definitely ‘of no importance’.

Figure (2) show response of the general surgeons to the different elements in ‘Time out’ according to their contribution to increased patient safety. All (100%) of the responders thought that ‘time out’ gives an opportunity to identify and solve problems, had a potential to guard against mistakes and strengthened the operating room team. Eighty-two percent of the responders felt that ‘time out’ had an educational potential and 64% thought that ‘time out’ provided them with more information about the patient that they did not otherwise have.

Figure (3) demonstrates response of the general surgeons to the different elements in ‘sign out’ according to their contribution to increased patient safety. The perceptions to most elements in the ‘sign out’ checklist were positive. All the surgeons (100%) thought that counting of instruments and sponges, identification of surgical specimens, checking of equipment and post-operative care were 'very important'. Post-operative identification of the procedure was the matter of debate as 45.5% thought that it is 'very important', similar percent thought it is 'important to some degree' while the remaining 9% thought it is 'probably without importance'.

DISCUSSION

All patient populations are at risk for administrative problems or human error. However, because of the number of different professional disciplines involved (anesthesiologists, surgeons, nursing, and ancillary staff), absolute number of required personnel, and variability of surgical procedures, the operating room (OR) environment is threatening to patient safety.[8]

Wrong-site/ wrong-patient/ wrong-procedure mistake is a rare event, but

catastrophic to the patient, the surgeon and the operation room team. The reported incidence is 1 in 15,000–1 in 30,000 procedures. [9] Wrong-site errors are usually errors of omission induced by distracting circumstances, involving checks that are not carried out.[36] Designing simple checklists, standardizing checks and involving more than one person in the checking process can help minimize such errors. [7] In spite of that, there have been a few interventional studies describing perioperative patient safety.[8]

The results showed that overall compliance on perioperative safety practices was low (52.7%) even when the majority of team members had received training. The results showed that surgeons achieved high compliance scores (100%) for checking prophylaxis antibiotics, confirm sterilization, checking of surgical instruments and sponges and checking biopsies labeling. Surgeons scored low in verifying the correct radiograph (72.7%). While the lowest compliance score (60%) for the introduction of team members. This low score observed in the present study may be due to the impact of time pressures and workload on the team's ability to perform 'time out' and still maintain patient safety. Significantly, the preoperative start-up period is the most crucial time because there are multiple procedures, all of which take precedence a situation that heightens the risk of errors. Results of the present study come in agreement with an observational analysis of surgical team compliance with perioperative safety practices[7] which conducted in Vanderbilt University Medical Center (USA) in an academic medical center's main operating room (USA) in the period between December 2004, and March 2005 . In this study, the surgical team compliance was with only 60% of perioperative safety practices after conduction of training program which

aimed to improve team communications and patient safety.

A study conducted in operating department in a large metropolitan hospital in southern Queensland, Australia (2010)[10] to identify implementation and practice issues associated with the introduction and ongoing use of a 'time out' protocol in a large healthcare organization in Australia, reported that in some instances, as a result of time and personnel constraints, study participants performed 'timeout' inconsistently, or not at all. Clearly, if 'time out' is to be effective in reducing the potential for errors in operation room, then its guidelines must be followed. The study added, that in Queensland public hospitals, there were 31 cases of procedures involving the wrong patient or body part reported during the period 2006/2007. [10] In all instances, the 'time out' protocol was either not implemented or not appropriately applied. For 'time out' to be useful as a patient safety initiative, a shift in organizational culture is required to determine how such safety initiatives are managed at the clinical interface, [11] with the view of redressing systems issues that contribute to increased workloads.

Our survey of general surgeons attitudes toward the introduction of a patient safety 'time out' showed that all (100%) of them believed that it increases patient safety. In addition, our survey also showed that the attitudes were mostly very positive (100%) to the elements that have an obvious and direct correlation to patient safety by reducing the risk of serious mistakes that are rare but avoidable, i.e. confirmation of correct identity, procedure and side, checking of surgical instruments and sponges and checking biopsies labeling. Accordingly, almost all responders thought that 'time out' has a potential to define, solve and prevent mistakes and improving communication between the operation team.

Other elements in the checklist with an impact on patient safety in a more complex context were also considered important, but frequently 'important to some degree' rather than 'very important.' Thus, some elements considered accordingly were confirmation that the correct procedure will start, post-operative confirmation about which procedure was undertaken and review of key concerns for recovery and management. These aspects exemplify the importance of good communication among the operating room team.

Introduction of the team members was the only element of the 'time out' considered to be 'important to some degree' by almost half of the responders (45%), and unimportant by 18% of the respondent. One reason could be that the staff members often know each other by name as well as role in Navy Hospitals. Another explanation could be that such a formal introduction may be considered to be less meaningful and even socially uncomfortable. Therefore, in our study, the team often skips this element of the 'time out' in practice.

Our results are in general agreement with an evaluation of a surgical checklist in Sweden [7] and in Canada. [12] In the study which conducted in Sweden, to assess whether structured team briefings improve operating room communication (2010), the researchers [7] reported 93% responded that 'time out' contributes to increased patient safety, and that confirmation of patient identity, correct procedure, correct side and checking of allergies or contagious diseases were considered 'very important' by 78–84% of the responders. Attitudes to checking of patient positioning, allergies and review of potential critical moments were positive but differed significantly between the professions. They concluded that staff attitudes toward a surgical checklist were mostly positive one year after their introduction in two large hospitals in central Sweden.

Nearly the results of the current study were observed by a thirteen month prospective study used a preintervention/postintervention design (2008)[12] where all staff and trainees including surgeons, nurses, and anesthesiologists in the division of general surgery at a Canadian academic tertiary care hospital participated. In that study, it was found that checklist function was informative and educational as 69% of the participants agreed that by using 'time out' they obtained some information about the patient that they otherwise would not have had, this is in agreement with our current survey (63%), but it was in contrast with another survey in other study[7] where only one fourth of the operating room staff obtained new information.

In a previously mentioned two studies. [7,6] there was low score of team member introduction in their studies, this was contradictory to their belief that this part of the 'time out' is also of major importance in patient safety because, when a member of a team has introduced themselves, it is easier to speak up again if they notice something that could threaten patient safety.

In a review of checklist use in operating room recently published, all studies showed positive effects and important benefits such as improved team cohesion, improved awareness of safety issues and reduction of errors.[13] Pre-operative checklist briefings have been shown to reduce unexpected delays in the operating room by 31%. [14]

Limitations of this study

Limitations of this study were; first, this study focused on surgeons as key respondents, which may have reduced the scope of the results. The perspectives of other members of the surgical team, such as anesthetists, nurses and technicians, could further lighten on how power relationships affect surgical outcomes. Second, it was conducted at one department, general surgery, which may be different from other departments, as orthopedic or urology departments. Third,

we did not conduct a survey before the routine ‘time out’ was introduced and thus we do not know whether this change in foutine altered attitudes.

Conclusion and recommendations

Based on the results of this study, it was concluded that Checklists improve the communication skills among surgical team members, so assist in dealing with patient safety to safeguard against the adverse events in the operation room. It is recommended that hospitals should consider implementing operating room briefings as a strategy to improve operating room efficiency and clinical and economic outcomes in surgical patients. Surgeons must be committed to the common goals of patient safety to ensure safe surgery. The full commitment from all heads of departments involved in the surgical process, and the leaders will facilitate the implementation and sustainability of the checklist. The integration of briefings into medical and nursing education to help improve the teamwork climate in operating rooms. Briefings may be beneficial before bedside procedures are performed in the inpatient setting, or at the start of a day or shift to proactively plan for potential problems. Assign responsibility of performing checklist to the whole operating room team and not to a designated person as recommended in the WHO Surgical Safety Checklist.

Further studies should address the perspectives of other members of the surgical team, such as anesthetists, nurses and technicians. Further studies should address whether introduction of these safety checks can also save lives, reduce morbidity, decrease delays and increase patient safety in military hospitals.

Table 1: Mean Score Percent of Compliance with 19 Safety Items of WHO Safe Surgery Checklist in The Anesthesia and Operation Department of The Study Hospital During the Study Period

Safety Items of the WHO Safe Surgery Checklist	Mean Score percent
Phase I: Sign in (before induction of anesthesia)	
Item 1: Confirmation of patient's identity, procedure planned, site of surgery, consent for surgery given.	100
Item 2: Confirmation that the surgeon marked the site of surgery.	100
Item 3: Completion of an anesthesia safety check.	98.2
Item 4: Confirmation that a functioning pulse oximeter is placed on the patient.	100
Item 5: Verbal confirmation whether the patient has a known allergy.	98.2
Item 6: Anesthesia team has assessed whether the patient has a difficult airway.	98.2
Item 7: Confirmation patient's risks losing >500 ml blood during surgery.	69.1
Phase II: Time out (before skin incision)	
Item 8: All team members introduced themselves by name and role	60.0
Item 9: Confirmation of patient's name, surgery performed, site of surgery and, positioning of patient	94.5
Item 10: Prophylactic antibiotics were given during the previous 60 minutes	100
Item 11: Asking each team member about any anticipated critical events	80.0
Item 12: a. Discussion with surgeon: the critical or non-routine steps? b.Discussion with anesthetist: any patient-specific concerns?	87.0 80.0
Item 13: Confirmation: sterilization successfully performed (indicator)	100
Item 14: Essential imaging is in the room and prominently displayed	72.7
Phase III: ' Sign out' (before the patient leaves the operating room)	
Item 15: Confirmation of the team the exact procedure done	81.8
Item 16: Confirmation the completeness of final sponge and needle counts	100
Item 17: Confirmation that correct labeling of any pathological specimen	100
Item 18: Equipment problems arising are identified by the team	100
Item 19: Review the post-operative recovery and management plan	81.8

The numerical numbering of items is corresponding to their order in the WHO check list

Table 2: The Observed Surgeries with Full Compliance to The All Items of Each Phase of Safe Surgery Checklist

Operation phase	Total Number of observed Surgeries (n=55)	Observed Surgeries with Full Compliance to All The Items	
		No	%
Sign in phase	55	35	65.5
Time out phase	55	31	56.4
Sign out phase	55	37	67.3
Overall Aggregate Compliance To All Items	55	29	52.7

Table (3): The Overall Compliance Score Percent of The Surgeons Compared to The Surgeons' Qualification

	Qualification	No	Mean score percent
Overall compliance	Master degree	9	9 2.87 ± 7.3
	Doctorate degree	2	80.5±0.7
t-test	2.295, P= 0.047, P<0.05		

Table (4): The Overall Compliance score percent of the surgeons Correlated to the Surgeons' Years of Experience

		Experience	Overall Compliance
Experience	Pearson Correlation	1	-0.160
	Number	11	11
Overall Compliance	Pearson Correlation	-0.160	1
	Number	11	11

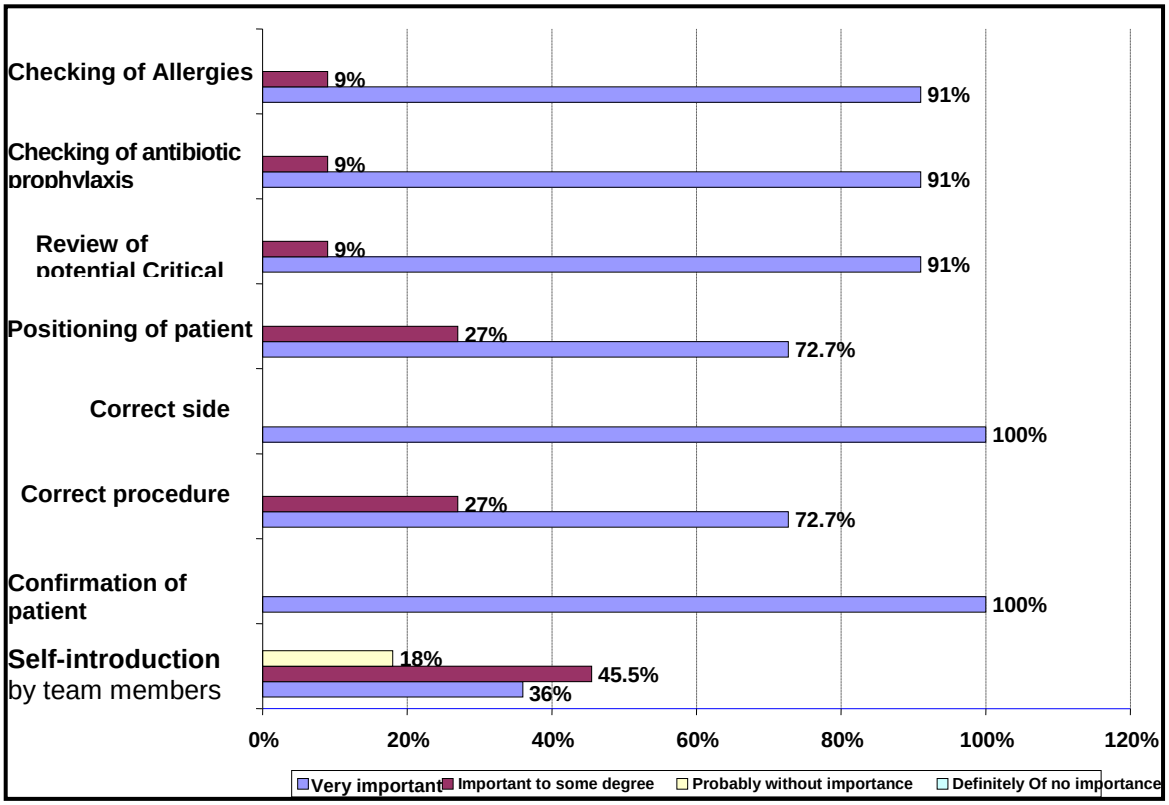

Fig (1): Response of the general surgeons to the importance of 'time out' as a tool for improving patient safety

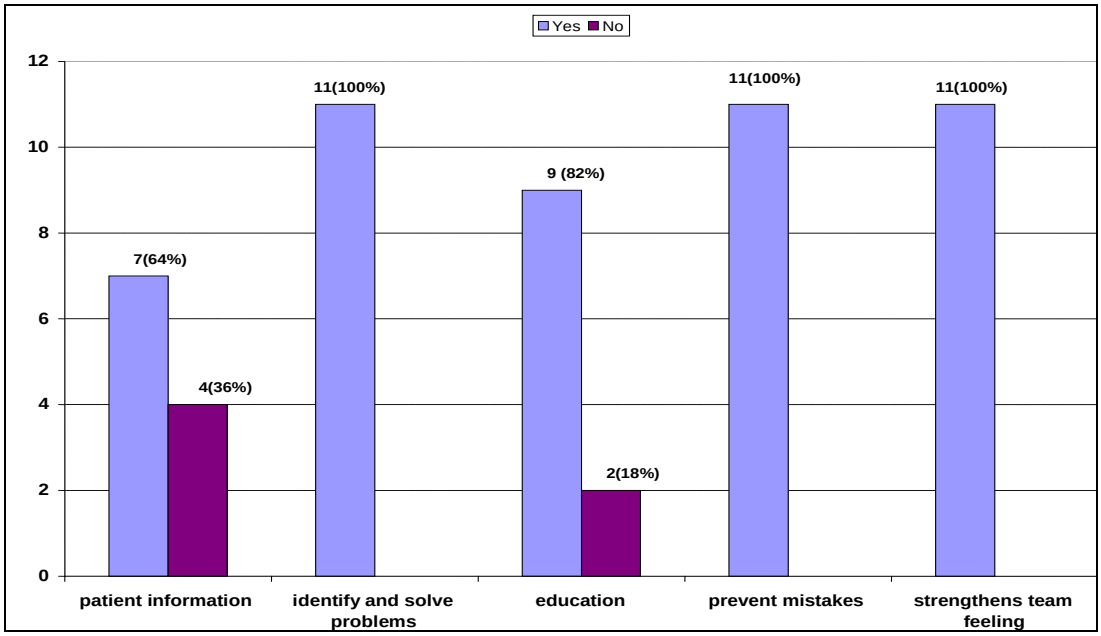

Fig (2): Response of the general surgeons to the different elements in 'Time out' according to their contribution to increased patient safety

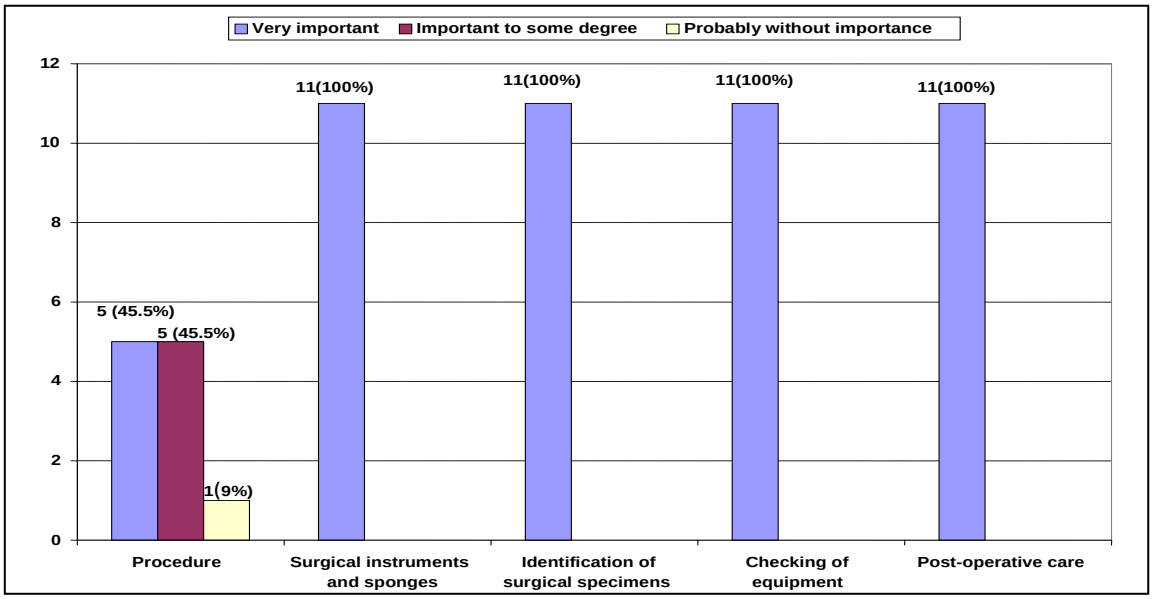

Fig (3): Response of the general surgeons to the different elements in 'sign out' according to their contribution to increased patient safety

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