Attitudes of Surgical Teams Towards Using Safe Surgery Practices and Factors Associated with Its Implementation.

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Abstract

Background: In recent years, there have been significant advancements in the field of patient safety, particularly in high-risk environments such as operating rooms. The importance of safety in surgical theaters cannot be overstated, as it directly impacts patient outcomes and satisfaction. With increasing morbidity and mortality rates, as well as the ever-evolving nature of surgical procedures, there is a growing emphasis on implementing safety measures to ensure the safety of patients and the success of surgical interventions. The adoption of the surgical safety checklist is a pivotal step towards achieving safer surgery, and understanding the attitudes and factors that influence its implementation is crucial. By conducting this study, valuable insights can be gained, leading to interventions and improvements in safe operating practices, ultimately enhancing patient outcomes in surgical settings. Aim: Identify attitudes of surgical teams towards using safe surgery practices and factors associated with its Implementation. Research design: A descriptive exploratory research design was used to conduct this study. Settings: The study was conducted in all operating rooms of Alexandria Main University Hospital, Egypt. Subjects: The subjects of the present study included a convenience sample of 157 surgeon, 83anesthetists, and 72 nurses. Tools: two tools were used to collect study data namely; Attitudes of Surgical Team toward Surgical Safety Checklist Questionnaire and Barriers and Facilitators of Surgical Safety Checklist Questionnaire. Results: This study showed that surgical team had positive attitudes toward the implementation of SSC with a mean score of (110.68± 11.74). The mean score of facilitating factors was (45.72±5.77). Among the facilitators, the highest score was for checklist related facilitators with a score of (3.92±0.85) and the lowest score was for the organizational facilitators with a score of (22.40±3.32). The overall mean score of barriers to Surgical Safety Checklist implementation (66.42±9.4l). The most important barrier to implement the checklist was the organizational barriers (14.86±2.51), while team barriers were the least important (10.03±2.51). Conclusion: The current study revealed that surgical team had moderate questionable attitude towards the implementation of SSC. Additionally, the current study found checklist related facilitators and team facilitators are the most important facilitators toward use of SSC. While, the organizational and system related barriers are the most reported barriers. Moreover, modifying SSC in a manner that remove ambiguity and redundancy of items to be fit with context of use as well as buffering organizational and system related barriers are helpful strategies to foster facilitate utilization of SSC in operating theatres at different settings. Recommendations: cultivating patient safety culture at operating theatres is a key toward incorporating SSC as routine manner during all surgical procedures. Making surgical verification using SSC as mandatory step before moving to other surgical steps is panacea toward optimizing SSC implementation at operating endeavours.

Introduction

In the modern healthcare setting, safety in surgical theaters is a corner stone domain in patient safety area. Surgical care is essential for saving lives and decreasing morbidities (Ay et al., 2023). Safety errors can result in harm and injuries in patients during surgery and even lead to death (Gürkan et al., 2022). Over 300 million surgical procedures are carried out each year worldwide. Despite awareness of adverse effects, surgical errors continue to occur at a high rate; 10% of avoidable patient harm in health care was reported in surgical settings *(*Högberg et al., 2019), with most of the resultant adverse events occurring before and after surgery *(*Santos, & Jones, 2023).

The magnitude of surgical adverse events is highly variable among regions. In Australia, 21.9% of surgical admissions were associated with adverse events such as wound infection and hemorrhage, and that 47.6% of these were preventable complications (de Jager et al., 2019). In the USA 6.2%–7.3% of surgical admissions resulted in death due to adverse events such as equipment or device failure, and only 0.5%–6.0% of adverse events contributing to death are preventable (Haukland et al., 2019). In Egypt 4–16% of patients admitted with surgical reasons to hospitals experience an adverse event, 43% of them were judged to be preventable (Al-Tehewy et al., 2020), and in Africa and the Middle East had a range of adverse events 2.5 - 18.4% (Macharia et al., 2016).

In the face of these high burdens of errors in surgical theatres, the international healthcare society called for intensifying efforts to eradicate such errors and patient safety threats. Coincident with this global awakening, the World Health Organization started to shed the light on safe surgery practices then Surgical Safety Checklist (SSC) was issued since 2009 which is a metaphor for safer surgery steps (Bansah et al., 2023).

The SSC is a tool that is completed or marked preoperatively or during the operation from one or more responsible persons. It is articulated around verbal verification by operating teams in terms of implementing the basic steps ensuring the safe delivery of anesthesia, effective teamwork, and other substantial steps or practices within the range of surgical interventions, which pass a well-defined process (Bains et al., 2020). The SSC consists of 22 items, divided into three phases: The "Sign In" occurs before induction of anesthesia*,* the "time out" occurs prior to incision of the skin and the "sign out" occurs before the patient leaving the operating room (Woodman & Walker, 2016)

Despite a gross reduction in the infection rate and morbidity following adoption of the checklist, many health-care providers are hesitant in implementing it in their everyday practice (Jain et al., 2018). It is noticeable that attitudes of healthcare providers toward adoption of safe surgery checklist are controversial with many contradictions. Many quality assurance programs across the world emphasized that one of the critical challenge toward patient safety is staff culture and attitudes toward safety practices (Dharampal et al., 2016). Meanwhile, these programs revealed that despite the vast majority of staff had high awareness and conceptualization of SSC; limited numbers of them apply safety practices included in this tool in the surgical theaters (Kisacik & Cigerci, 2019).

Contemporary literature shed the light on the reasons beyond the limited implementation of safe surgery practices as well as the factors affecting the application of these practices by healthcare providers. Analysis of these factors revealed a number of barriers and facilitators that should be considered as the implementation of safe surgery practices require an approach that includes eliminating barriers and supporting facilitating factors (Khodavandi et al., 2021).

Khodavandi et al. (2021), classified the facilitating factors into four dimensions namely; organizational facilitators, systemic facilitators, team facilitators, and checklist-related facilitators. Bains et al. (2020), emphasized that efficient staff

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training, regular monitoring, leaders support, just blaming-free culture, and positive workplace environment were the highly reported facilitators. Naidoo et al. (2017), reported that positive attitudes of staff, surgical team collaboration, and clear instructions of SSC are critical success factors that facilitate implementation of safe surgery practices in operating theaters.

On the other hand, Fourcade et al. (2012) identified eleven organizational barriers facing implementation of SSC. These barriers include the duplication of checklist items with checks already in place, poor communication between team members, perception of the checklist as a time-consuming process without the addition of benefit to patient care and safety, poor timing for completion of the list, worsening of patient anxiety, uncertainty about each member's role, inappropriate nature of the set questions for different centers, and 'gaming' where items not checked are marked off as checked.

Aims of the Study

This study aims to identify attitudes of surgical teams towards using safe surgery practices and factors associated with its Implementation.

Research Questions:
- What are the attitudes of surgical teams toward implementation of safe surgery practices?
- What are the factors associated with the implementation of safe surgery practices?

Materials and Method

Materials

Design: A descriptive exploratory research design was used to conduct this study.

Settings: This study was conducted in all operating rooms of Alexandria Main University Hospital. It's a general tertiary care hospital equipped with 9 operating theaters including 35operating rooms.

Subjects: All target population available in the study setting (N= 312) was recruited to collect the required data as the following; 157 surgeon,

83 anesthetists, and 72 nurses. **N.B** Data regarding target population obtained from human resources records available at human resource department and central administration for Alexandria university hospitals.

Tools: In order to collect the necessary data for the study two tools were used:

Tool one: "Attitudes of Surgical Team Toward Surgical Safety Checklist Questionnaire". This tool was developed by Bains et al. (2020) and was adopted by researcher to explore attitudes and beliefs of surgical teams of the study setting toward implementation of surgical safety checklist. It composed of 32 items grouped into 3 dimensions as follows; awareness about SSC use (n=18 items), culture and safety practices (n=3 items), and attitudes regarding SSC use (n=11 items). Subjects attitudes were measured on a five point Likert scale ranging from 1= strongly disagree to 5 = strongly agree. High scores indicate positive attitudes of surgical team toward the use of surgical safety checklist. Reliability was measured using cronbach's alpha =0.860 (Bains et al. 2020) The overall scoring system was ranging from 32 to160, scoring range from 32 to less than 75 reflects negative attitudes toward SSC. Scoring ranges from 75 to less than 118 reflects questionable attitudes toward SSC. Scoring ranges from 118 to 160 reflects positive attitudes toward SSC.

Tool two: "Barriers and Facilitators of Surgical Safety Checklist Questionnaire" This tool was developed by Khodavandi et al. (2021) and was adopted by the researcher to investigate factors associated with implementation of SSC in the surgical theaters of the study setting. It divided into two parts;

Part (I): Facilitators of implementing Surgical Safety Checklist: It comprises of 12 items grouped into 4 dimensions as follows; organizational facilitators (n=6), systemic facilitators (n=1item), team facilitators (n=4), and checklist related facilitators (n=1 item). Responses were measured on a five point Likert scale ranging from 1= strongly disagree to 5 = strongly agree the overall scoring system was

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ranging from 12 to 60 where, scoring ranging from 12 to less than 28 indicates low perceived facilitators. Scoring ranging from 28 to less than 44 indicates moderate perceived facilitators. Scoring ranging from 44 to 60 indicates high perceived facilitators.

Part (II): Barriers of implementing Surgical Safety Checklist: It comprises of 19 items grouped into 4 dimensions as follows; organizational barriers (n=4), systemic barriers (n=2), team barriers (n=3), checklist related barriers (n=10). Responses were measured on a five point Likert scale ranging from 1= strongly disagree to 5 = strongly agree. The overall scoring system was ranging from 19 to 95 where, scoring ranging from 19 - 44 indicates low perceived barriers. Scoring ranging from 45 to less than 70 indicates moderate perceived barriers. Scoring ranging from 70 - 95 indicates high perceived barriers. Reliability was measured using cronbach's alpha =0.860 (Khodavandi et al. 2021).

In addition, a sheet was developed by the researcher to assess the personal and professional characteristics of the surgical teams of the study settings such as age, gender, years of experience, qualification, department, profession, position/ designation, previous attendance of workshop concerning surgical theater safety and previous use of SSC in other health setting.

Method

Approval of the Research Ethics committee (REC) of the faculty of nursing was obtained (IRB00013620). An official approval to conduct this study was obtained after providing explanation of the aim of the study. The study tools were translated into Arabic and tested for its face and content validity by five experts in the study's field from nursing administration department, Faculty of Nursing, Alexandria University. The adjustments were done based on experts' opinions such as re-wording some questions. Reliability of the study tools was tested using Cronbach's alpha coefficient. The tools verified reliability, where Attitudes of Surgical Team Toward Surgical Safety Checklist Questionnaire (α= 0.795), Facilitators of

implementing Surgical Safety Checklist Questionnaire (α=0.750), Barriers of implementing Surgical Safety Checklist Questionnaire(α=0.833) and Total Barriers and facilitators of the implementation of the safe surgery checklist (α=0.827) which indicating good reliability. A pilot study was carried out on 10% of the study sample in order to test the clarity and applicability of the research tools.

Data collection was conducted by the researcher and the questionnaires (tool I, II) were hand delivered to the study subjects at the study settings. The researcher met with each one of the surgical team to explain the aim of the study and invited them to participate in study. The questionnaires took time ranged from 20-25 minutes to be filled. Data collection took three months from the beginning of February 2023 to end of June 2023.

Ethical considerations

A written informed consent of the study subjects was taken. Right to refuse to participate in the research or to withdraw during research at any time was assured. Confidentiality of data and anonymity of study subjects was maintained.

Statistical Analysis

After data was collected, it was revised, coded, and fed to statistical software IBM SPSS version 25. The reliability of the tools was determined by Cronbach's alpha. Frequency tables and cross-tabulation were used to illustrate the results. Quantitative data were summarized by the arithmetic mean, standard deviation, and mean score percent. All statistical analysis was done using two-tailed tests and an alpha error of 0.05. A P-value less than or equal to 0.05 was considered to be statistically significant.

Results

Table 1 shows the personal characteristics of study participants. Accordingly; more than three quarters (79.8%) of surgical team aged from 25 to less than 35 years. In addition, less than three quarters 70.2% of them were males, and 29.8% of them were females. With respect to their years of experience, it ranged from 1 to 35 years, where

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the majority 81.7 of the surgical teams had less than 10 years of experience. As regard their educational qualification, it was varied as these with Ph.D. degree constituted 10.3% of them, followed by master and diploma degree (16.3) % of them. The same table reveals that the vast majority 96.2%of the surgical team didn't attend any workshop related to surgical safety practices compared to 3.8% of them who attend these workshops. Moreover, only 9.0% of the surgical teams reported previous attendance of workshops or seminars related to quality requirements of GAHAR. Finally; the majority of 98.7% of surgical teams did not work previously in any settings that apply SSC compared to 1.3% who reported previous working in healthcare settings that apply SSC.

Table 2 reveals levels of the surgical team attitudes toward SSC use**.** Accordingly; the mean percent score of the overall attitude of the Surgical team was 69.18% with a mean score of (110.68± 11.74), which indicates positive attitude towards SSC. In particular; awareness about SSC use had the highest mean percent score (70.18%), with a mean score (63.16 ± 6.80), followed by culture and safety practice (68.83%) with a mean score of (10.33± 2.15), and finally attitude regarding SSC use (67.60%) with a mean score of (37.18 ± 5.80). In addition, more than one quarter (28.5%) of the surgical team had a positive total attitude towards SSC compared to 71.5% who had perceived questionable levels.

Table 3 portrays levels of surgical team according to their perception of facilitators of surgical safety checklist implementation. The overall facilitators mean score (45.72±5.77) with a mean percent score (76 ± 20%). In specific; the highest facilitator dimension was checklist related facilitators (78.40%) with a mean score of (392±0.85) while, the least facilitator dimension was organizational facilitators (4.67%) with a mean score of (2240±3:32). In addition, checklist related facilitators recorded the highest perceived level among the majority of surgical team (77.6%) while organizational facilitators are the least perceived facilitators for SSC as only 52.2% of surgical team had high perceived level.

Table 4 represents levels of surgical team according to their perception of barriers of surgical safety checklist. The overall barriers mean score was (66.42±9.4l) with a mean percent score of (69.92%). In particular; the first barriers were the organizational barriers (74.30%), followed by systemic barriers (69.70 %), checklist related barriers (69.12%) and finally the team barriers (66.87 %). In addition, organizational barriers recorded the highest perceived barriers among surgical team since 51.6% of them had high perceived level while team related barriers are the least perceived since only 28.5% of surgical team had high level.

Discussion

The hallmark of contemporary nursing practice is maintaining patient safety in the highly sensitive areas especially operating theaters where there is dynamic complex environment with many factors that if not addressed could threaten patient safety. In addition, safer surgery is gained high momentum recently in the international healthcare society with great emphasis on barriers and facilitators toward safe operating practices. The current study shed the light on application of surgical safety checklist which is a metaphor for safer surgery. It is aimed to explore the attitudes of surgical team toward implementation of surgical safety checklist. As well, the current study provides insights about what facilitate or hinder the adoption of SSC at operating theaters.

Regarding the level of overall surgical teams' attitude towards implementation of SSC. It was found by the current study that surgical teams had moderate questionable attitudes toward the implementation of SSC, which doesn't align with the Egyptian Vision 2030's direction to upgrade the healthcare sector following the inception of universal health insurance. The reported factors contributing to this outcome included heavy workloads, poor top management support for patient safety issues, and a lack of just culture due to arbitrary measures toward a vulnerable health workforce. These perspectives help explain why negative attitudes toward safer surgery practices, especially the use of SSC, were observed.

Moderate questionable attitude of surgical team in the current study is the case in the studies of Fourcade et al., (2012), Russ et al, (2015), Bains et

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al, (2020), Munthali et al, (2022) & Bansah et al, (2023) they reported that the surgical teams had negative perception and attitudes towards the SSC. Furthermore, the study of Davids et al, (2023) found that there are significant factors influencing the level of satisfaction with SSC implementation, these factors might be essentially related to heavy workloads and lack of ability about SSC implementation. In this context, Ilorah et al, (2024) concluded that the negative attitude of staff towards SSCL is a significant factor in most of the studies in deterring effective implementation and use. A negative attitude can lead to poor compliance with the checklist, compromised patient safety, poor teamwork and increased rates of surgical complications such as infections, haemorrhage, and anesthesia-related issues.

In contrary to the study findings, Positive attitude of surgical team in the case of the studies of Dharampal et al, (2016), Wangoo et al, (2016), Kilbane et al, (2020), Tan et al, (2021), Urban et al, (2021) These studies reported positive prevailing perception and attitudes of healthcare providers toward implementation of SSC which is contradictory to the current study. In this context, El-sayed, et al., (2023) conducted a study to delineate missed nursing care at operating theaters in the study setting and found care items related to patient safety in operating rooms are the least missed items which could support the positive attitude of surgical team in the current study. Furthermore, the study of Kisacik, & Cigerci (2019) & Ferorelli, et al (2022) found high adherence and compliance of healthcare providers especially nurses with the use of SSC at operating theatres which is parallel to the findings of the current study. Study claimed that the surgical team reported that SSCs facilitate better communication among surgical team members, leadership support, ongoing education, legal and regulatory compliance, Implementing SSC often leads to a broader cultural shift within institutions, increased accountability and professional satisfaction in reducing complications and improving outcomes. Also, SSCs help in standardizing the steps in surgical procedures, which reduces variability and confusion. All these staff' perspectives provide explanations for why surgical teams had positive attitudes toward safer surgery practices especially the use of SSC in these studies

Exploring factors that could facilitate the implementation of SSC for safer surgery is critical issue among patient safety advocates and surgical clinicians worldwide. The overall results of the current study indicated the importance of facilitators in all dimensions. Education programs and training, regular feedback of local data, accountability for non-compliance, support from hospital management, integration with exiting process, strong individual leadership skills and involvement of all team members in the implementation and modification of the checklist improves uptake and facilitate the implementation of SSC.

One important finding in the current study is that checklist related facilitators are the highest perceived and top ranked items. This reflects that conducting modifications in the present SSC to fit the context of use is a promising strategy to upgrade safer surgery practices. This impression is evident in the current study since the majority of surgical team commented on the importance of modification or adaptation of the SSC through ownership and effective use of the checklist improved by customization of the layout and /or content to the specific surgical context. These results are in accordance with Russ et al, (2015), who reported that the most commonly reported facilitator to implementation of the checklist was modification of the tool to suit the specific surgical context and/or to make it more user-friendly the checklist had been successfully adapted to suit surgical specialties. In the same line, Bergs et al, (2015) reported that the design of the checklist is very important and involving personnel in the design, appropriate trialing and revision, on-going refinement and staff training will facilitate the implementation of surgical safety checklist. In the same context, Bergstrom et al. (2016), McLaughlin, et al. (2016) and Cray, et al. (2018) illustrated that the information on the design and implementation of checklists, consultation and feedback as well as appropriate training will facilitate the implementation of surgical safety checklist.

Conversely, the studies of Georgiou et al,(2018), Kilbane et al, (2020) & Khodavandi et al, (2021) found that a more comprehensive approach, including strong leadership support, organizational culture emphasizing safety, and

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effective communication, played a more pivotal role in the adoption of SSC. These conclusions may be attributed to poor supporting workplace, hierarchal leadership styles, and lack of implementation policies which make healthcare providers perceived that acting of organizational and system factors could augment the implementation of SSC.

Examining barriers toward the implementation of safer surgery practices especially the use of SSC is of paramount importance to patient safety and nursing practice. The current study revealed critical barriers that hinder implementation of SSC such as lack of support from senior healthcare workers and management, poor harmony among different authorities, time-consuming process, lack of involvement of process owners in the analysis of risks related to misuse or refrain of SSC, lack of staff awareness about SSC benefits for patient care and safety, poor timing for completion of the list, and absence of change culture. These barriers are the most perceived and reported by surgical teams which give impression about the role of management and systems in upgrading patient safety practices in different contexts. This is evident in the types of SSC barriers as the majority of reported barriers are system and organizational barriers. This was attributed to the high work load in the study setting with resources scarcity which make the use of SSC is not at top priority.

It is not supersizing to found these barriers toward the use SSC in the current study since similar different studies reported these barriers in its conclusions. Bergs et al., (2015) highlighted hierarchical positioning, lack of knowledge, and lack of ownership as significant barriers in the SSC implementation processes. Kariyoi et al. (2013) and Munthali et al, (2022) concluded that organizational and cultural barriers can be critical to long-term utilization of the SSC, and need for strong supportive leadership to overcome these issues. Moreover, Naidoo et al. (2017), and Tostes and Galvão (2019) reported that the lack of administrative and management support and absence of education were the most important barriers toward adoption of SSC.

Despite system and organizational barriers to SSC use are received consensus in the majority of studies which is similar to the current study, other studies found team and checklist related barriers

such as poor communication between team members, ambiguity of some items in the checklist, duplication of checklist items, ambiguity of some items in the checklist were the most reported barriers. For example, O'Connor et al, (2013), Russ et al, (2015), Mutsumi & Midigo, (2019), Khodavandi et al., (2021) & Bansah et al, (2023) found that the most common barriers to checklist implementation were team related barriers. These findings may be related to several factors such as effective leadership who believe in the importance of patient safety and support the use of checklists can reduce resistance and enhance implementation, effective communication within the surgical team and between different departments, this can reduce organizational barriers, integration of human elements such as good training and effective interaction between team members are integrated, organizational barriers may have less impact. All in all, the current study proved that moderate questionable attitudes of surgical teams toward SSC use are associated with low adoption rates. Moreover, cultivating a supporting safety culture that buffer the organizational and system barriers of SSC use while considering contextual checklist fit are pivotal ways to safe surgery in any healthcare facility.

Conclusion

The current study revealed that surgical team had moderate questionable attitude towards the implementation of SSC. Additionally, the current study found checklist related facilitators and team facilitators are the most important facilitators toward use of SSC. While, the organizational and system related barriers are the most reported barriers. Moreover, modifying SSC in a manner that remove ambiguity and redundancy of items to be fit with context of use as well as buffering organizational and system related barriers are helpful strategies to foster facilitate utilization of SSC in operating theatres at different settings.

Recommendations

In line with the findings of the study, the following recommendations are made:

- Cultivating patient safety culture at operating theatres is a key toward incorporating SSC as routine manner during all surgical procedures.

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- Making surgical verification using SSC as mandatory step before moving to other surgical steps is panacea toward optimizing SSC implementation at operating endeavours.

- Regular scientific meetings for both surgeons and nurses who provide direct care for surgical patients must be conducted to discuss patients' problems and to detect barriers of adherence to the surgical safety checklist.

- Build friendly design for SSC to be contextually fit using concerns and views of surgical clinicians is a must issue toward safer surgery.

- Senior clinicians at operating theaters must reinforce application of SSC among different surgical teams and beginners of clinicians to be stipulated as required procedure across time.

- Explore the integration of emerging technologies, such as augmented reality or artificial intelligence, to enhance the efficiency and effectiveness of the surgical safety checklist.

- Develop strategies for global implementation, considering the varying healthcare infrastructures, resources, and cultural contexts, to promote widespread adoption of the surgical safety checklist.

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Table (1): Personal and work-related data of the surgical team (n=312)

Personal and work-related data		Surgical Team						Total N=312	
		Surgeons N=157		Anesthesiologists N=72		Nurses N=83			
		N	%	N	%	N	%	N	%
Age	< 25 years	0	0.0%	0	0.0%	15	18.1%	15	4.8%
	25 - < 36 years	127	80.9%	72	100.0%	50	60.2%	249	79.8%
	36 - < 45 years	28	17.8%	0	0.0%	13	15.7%	41	13.1%
	> 45 years	2	1.3%	0	0.0%	5	6.0%	7	2.2%
Sex	Male	145	92.4%	52	72.2%	22	26.5%	219	70.2%
	Female	12	7.6%	20	27.8%	61	73.5%	93	29.8%
Number of years of experience in operating theaters	< 10 years	140	89.2%	72	100.0%	43	51.8%	255	81.7%
	10 -20 years	17	10.8%	0	0.0%	32	38.6%	49	15.7%
	21 -30 years	0	0.0%	0	0.0%	5	6.0%	5	1.6%
	> 30 years	0	0.0%	0	0.0%	3	3.6%	3	1.0%
Qualifications	Diploma	0	0.0%	0	0.0%	51	61.4%	51	16.3%
	Specialized Diploma	0	0.0%	0	0.0%	5	6.0%	5	1.6%
	Bachelor	43	27.4%	31	43.1%	27	32.5%	101	32.4%
	Master	83	52.9%	40	55.6%	0	0.0%	123	39.4%
	Ph.D	31	19.7%	1	1.4%	0	0.0%	32	10.3%
Previous attendance of workshop or seminar related to surgical safety practices?	No	156	99.4%	66	91.7%	78	94.0%	300	96.2%
	Yes	1	0.6%	6	8.0%	6	7.2%	13	4.1%
Place of attendance of Previous workshop	Educational Settings	1	0.6%	6	8.3%	0	0.0%	7	2.2%
	Heath care settings	0	0.0%	0	0.0%	6	7.2%	6	1.9%
Previous attendance of workshop or seminar related to the quality requirements of the General Authority for Health Accreditation and Control (GAHAR)?	No	157	100.0%	71	98.6%	56	67.5%	284	91.0%
	Yes	0	0.0%	1	1.4%	27	32.5%	28	91.0%
Previous working in health care setting where the WHO Safe Surgery Checklist is applied?	No	157	100.0%	69	95.8%	82	98.8%	308	98.7%
	Yes	0	0.0%	3	4.2%	1	1.2%	4	1.3%
Name of the place working that apply the WHO Safe Surgery Checklist?	Governmental Hospitals	0	0.0%	1	1.3%	0	0.0%	1	0.3%
	Private hospitals	0	0.0%	2	2.8%	1	1.2%	3	1.0%

Table (2): Levels of the surgical team attitudes toward surgical safety checklist use

Dimensions of attitudes of the surgical team toward SSC	Levels	Surgical team attitudes toward SSC						Total		Mean ± SD	Mean score percent	Test of Significance
		Surgeons N=157		Anesthesiologists N=72		Nurses N=83		N=312				
		N	%	N	%	N	%	N	%			
Awareness about SSC use	Negative	0	0.0	0	0.0	0	0.0	0	0.0	63.16±6.80	70.18%	χ2 =5.004 P=(0.082)
	Questionable	104	66.2	57	79.2	53	63.9	214	68.6			
	Positive	53	33.8	15	20.8	30	36.1	98	31.4			
Culture and safety practices	Negative	15	9.6	11	15.3	1	12.0	27	8.7	10.33±2.15	68.87%	χ2=12.819 P=(0.012)*
	Questionable	92	58.6	47	65.3	55	66.3	194	62.6			
	Positive	50	31.8	14	19.4	27	32.5	91	29.2			
Attitudes regarding use of SSC	Negative	4	2.5	1	1.4	1	1.2	6	1.9	37.18± 5.80	67.60%	χ2=2.994 p=(0.559)
	Questionable	111	70.5	45	62.5	60	72.3	216	69.2			
	Positive	42	26.8	26	36.1	22	26.5	90	28.8			
Overall level of attitudes of the surgical team toward SSC	Negative	0	0.0	0	0.0	0	0.0	0	0.0	110.68±11.74	69.18%	χ2=2.732 p=(0.255)
	Questionable	109	69.4	57	79.2	57	68.7	223	71.5			
	Positive	48	30.6	15	20.8	26	31.3	89	28.5			

χ2 Chi-square test, p ≤0.05

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Table (3): Levels of surgical team according to their perception of implementation facilitators of surgical safety checklist (N=312)

Facilitators of surgical safety Checklist implementation	Levels	Surgical team perception of facilitators of SSC						Total N=312		Mean ± SD	Mean score percent	Test of Significance
		Surgeons N=157		Anesthesiologist N=72		Nurses N=83						
		N	%	N	%	N	%	N	%			
Organizational facilitators	Low perceived	3	1.9	0	0.0	2	2.4	5	1.6	22.40±3.32	74.67%	χ2=5.074 p=(0.280)
	Moderate perceived	71	45.2	40	55.6	33	39.8	144	46.2			
	High perceived	83	52.9	32	44.4	48	57.8	163	52.2			
Systemic facilitators	low perceived	11	7.0	4	5.6	3	3.6	18	5.8	3.79±0.85	75.80%	χ2=2.081 p=(0.721)
	Moderate perceived	39	24.8	22	30.6	25	30.1	86	27.6			
	High perceived	107	68.1	46	63.9	55	66.3	208	66.7			
Team facilitators	low perceived	7	4.4	0	0.0	3	3.6	10	3.2	15.61±2.69	78.05%	χ2=7.358 p=(0.118)
	Moderate perceived	33	21.0	23	31.9	15	18.1	71	22.8			
	High perceived	117	74.5	49	68.1	65	78.3	231	74.0			
Checklist related facilitators	low perceived	10	6.4	4	5.6	3	3.6	17	5.4	3.92±0.85	78.40%	χ2=2.772 p=(0.597)
	Moderate perceived	23	14.6	16	22.2	14	16.9	53	17.0			
	High perceived	124	79	52	72.2	66	79.5	242	77.6			
Overall facilitators of surgical safety Checklist implementation	Low perceived	1	0.6	0	0.0	0	0.0	1	0.3	45.72±5.77	76.20%	χ2=2.589 p=(0.629)
	Moderate perceived	56	35.7	31	43.1	28	33.7	115	36.9			
	High perceived	100	63.7	41	56.9	55	66.3	196	62.8			

χ2 Chi-square test, p ≤0.05

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Table (4): Levels of surgical team according to their perception of implementation barriers of surgical safety checklist (N=312)

Barriers of surgical safety Checklist implementation	Levels	Surgical team perception of barriers of SSC						Total		Mean ± SD	Mean score percent	test of Significance
		Surgeons N=157		Anesthesiologists N=72		Nurses N=83		N= 312				
		N	%	N	%	N	%	N	%			
Organizational barriers	Low perceived	2	1.3	0	0.0	1	1.2	3	1.0	14.86±2.51	74.30%	χ2=6.415 p=(0.170)
	Moderate perceived	67	427	43	59.7	38	45.8	148	47.4			
	High perceived	88	56.1	29	40.3	44	53	161	51.6			
Systemic barriers	low perceived	17	10.8	6	8.3	3	3.6	26	8.3	6.97±1.72	69.70%	χ2=7.276 p=(0.122)
	Moderate perceived	65	41.4	40	55.6	41	49.4	146	46.8			
	High perceived	75	47.8	26	36.1	39	47.0	140	44.9			
Team barriers	low perceived	30	19.1	10	13.9	14	16.9	54	17.3	10.03±2.51	66.87%	χ2=6.495 p=(0.165)
	Moderate perceived	80	51	48	66.7	41	49.4	169	54.2			
	High perceived	47	29.9	14	19.4	28	33.7	89	28.5			
Checklist related barriers	low perceived	8	5.1	2	2.8	0	0.0	10	3.2	34.56±6.25	69.12%	χ2=4.759 p=(0.313)
	Moderate perceived	87	55.4	40	55.6	50	60.2	177	56.7			
	High perceived	62	39.5	30	41.7	33	39.8	125	40.1			
Overall barriers of surgical safety Checklist implementation	Low perceived	2	1.3	1	1.4	0	0.0	3	1.0	66.42±9.41	69.92%	χ2=1.862 p=(0.761)
	Moderate perceived	91	58	45	62.5	47	56.6	183	58.7			
	High perceived	64	40.8	26	36.1	36	43.4	126	40.4			

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