

ORIGINAL ARTICLE

ASSESSMENT OF SAFETY LEVELS IN OPERATION ROOMS AT TWO MAJOR TERTIARY CARE PUBLIC HOSPITALS OF KARACHI. “SAFE SURGERY SAVES LIFE”

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Background: The objectives of this study are to determine the knowledge and attitude towards surgical safety among the health care professionals including surgeons, anaesthetist, hospital administrators, and operation room personnel and raise awareness towards the importance of safe surgery. **Method:** A pilot cross-sectional study of 543 healthcare providers working in the operating rooms and the surgical intensive care units was conducted in two tertiary care hospitals, within a study period of one month. A structured questionnaire was constructed and an informed verbal consent was taken. The questionnaire was then distributed; data collected and analysed on SPSS 20.0. **Results:** A total of 543 respondents participated in the study out of which there were 375 (69%) men and 168 (31%) women. The ages ranged between 23–58 years, mean 40.5±24.74. There were 110 (20.25%) surgeons, 58 (10.68%) anaesthetist, 132 (24.30%) trainees, 125 (23.02%) technicians, and were 118 (21.73%) nurses. The question regarding briefing operation room personnel is important for patient safety was agreed by 532 (98%) respondents. Amongst the respondents, 239 (44%) did not feel safe to be operated in their own setup. Team communication improvement through the check list implementation was agreed by 483 (89%) respondents. 514 (94.7%) opted for the checklist to be used while they are being operated. That operation room personnel frequently disregard established protocols was agreed by 374 (69%) respondents. 193 (35.54%) of the respondents stated that it is difficult for them to speak up in the OR if they perceive a problem with patient care. **Conclusion:** Operation room personnel were not aware of several important areas related to briefing, communication, safety attitude, following standard protocols and use of WHO Surgical Safety check list. A pre-post intervention study should be conducted after formal introduction of the Checklist. Successful implementation will require taking all stake holders on board and rigorous training workshops, reinforcing and revisiting.

Keywords: Knowledge, Patient Safety, Operating rooms, Patient Care, Checklist, Critical Care

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INTRODUCTION

Surgical care is an essential component of health care worldwide and is considered to be the end point for disease management. It is a universal discipline that is practiced across every community with the annual global volume of surgical procedures performed estimated to be around 313 million.¹ The impact of surgical intervention on public health systems continues to grow and more recently the Lancet Commission on Global Surgery, launched in January 2014, highlighted the importance of surgery as an “indivisible, indispensable part of healthcare.”² According to the commission’s report, 5 billion people worldwide do not have access to safe, affordable surgery and anaesthesia care with accessibility worst in the low-income and middle-income countries (LMICs). The global incidence of cancer, road traffic accidents and cardiovascular and metabolic diseases is projected to increase from now until 2030 in the LMICs. This will require substantial increase in surgical services in these regions and an estimated 143 million additional surgical procedures

will be needed in LMICs to prevent disability and save lives.¹

Surgical interventions are routine aspect of disease management and surgical safety is now a global public-health concern as unsafe surgical care can lead to death and disability.³ Studies in developed countries have shown a peri-operative rate of death from inpatient surgery of 0.4–0.8% and a rate of major complications of 3–17%.³ This leads to greater significance being attached to the various surgical protocols in practice world over and need for these methods to be promptly reviewed and updated in light of pre-operative, post-operative events and complications, surgical and allied personal performance and patient safety and satisfaction.

The abundant literature available worldwide on surgical safety and prevalent protocols shows that surgical outcomes are greatly influenced by the safety culture⁴, effective communication among the entire surgical team⁵, pre-operative briefings⁶, better team work⁷, adherence to surgical protocol and the work environment⁸.

The safety attitude questionnaire SAQ is an international standardized assessment tool to gauge the safety climate at a surgical facility. Through regional and specific modifications, the SAQ has been an effective method of understanding the implications and inhibitions of surgical setup globally.⁹

In 2008, World Health Organization (WHO) published guidelines to ensure the safety of surgical patients' worldwide.¹⁰ On the basis of these guidelines, a 19-item checklist was developed by a team of experts from Harvard, Boston.¹¹ The checklist was intended to be globally applicable with the aim to reduce the rate of major surgical complications. WHO Surgical Safety Check list was evaluated in eight hospitals around the world and it is observed that by applying simple surgical check list, the incidence of surgery related deaths and complications were reduced by one third.¹²

Unfortunately, limited literature is available locally on the volume and standards of surgeries performed in Pakistan which paint a dismal picture of patient care in the country.¹³ Pre-operative and post-operative evaluation and care in Pakistan are a major concern for patients, especially in public healthcare facilities.¹⁴ There is a need for evaluation of the surgical safety attitude among the health care professionals before practical standards can be adjudged.

The objectives of this study are to determine the knowledge and attitude towards surgical safety among the health care professionals and raise awareness of surgeons, anaesthetist, hospital administrators, and operation room personnel towards the importance of safe surgery, the implications of unsafe surgery and the potential for the effective implementation of the WHO Surgical Safety checklist to save thousands of lives.

MATERIAL AND METHODS

A cross-sectional pilot study of 543 healthcare providers working in the operating room and the surgical intensive care units was conducted to understand the attitudes and practices regarding surgical safety. We also evaluated the healthcare workers' attitudes towards the WHO Safe Surgery Saves Lives (SSSL) check list implementation in the operating rooms using the Safety Attitudes Questionnaire (SAQ). The survey was conducted at two tertiary care public hospitals (Jinnah Post Graduate Medical Centre and Civil Hospital Karachi) of Karachi from January to February 2015.

The Safety Attitude Questionnaire (SAQ) includes questions/ statements regarding team work, safety climate, and perception of management. It was adapted to include two components, i.e., safety

culture and team work climate and the relevant questions regarding the SSSL checklist were incorporated into the SAQ (Table-1). Each of the items on the SAQ is answered using a five-point Likert Scale. The questionnaire also included details pertaining to gender, professional background, experience in current job and overall experience in healthcare.

The questionnaire was personally administered to the target population by the researchers. The questionnaire was adequately discussed by the investigators and pre-determined phrases were decided to reduce errors. A brief introduction to the SSSL checklist was given to each respondent and a copy was also shown of the same. The questionnaire was administered in general surgery, orthopaedics and neurosurgery wards, the department of anaesthesia and surgical intensive care units. Careful consideration was given to eliminate repetition and bias. A verbal consent was taken from each respondent before administering the questionnaire. Confidentiality of the respondents was ensured and maintained by the researchers.

All data was entered and analysed through SPSS version 20. Cross-tabulations were performed to get relations between study variables, various surgical units and the designated members of the surgical teams. Chi Square test was used to observe the significant relationships between categorical variables. The p -value <0.05 was considered as statistically significant.

RESULTS

A total of 543 respondents participated in the pilot study out of which there were 375 (69%) men and 168 (31%) women. The ages ranged between 23–58 years and the average age was 40.5 with an SD of 24.74. There were 110 (20.26%) surgeons, 58 (10.68%) anaesthetists, 132 (24.31%) trainees, 125 (23.02%) technicians, and 118 (21.73%) nurses who participated in the study. Out of the total respondents, 293 (53.96%) had more than ten years of experience in health care as given in table-1. The operation theatre personnel responses to various statements are given in table-2. The question on briefing operation room personnel being important for patient safety was agreed by 532 (98%) respondents. Across all departments, 239 (44%) participants did not feel safe to be operated in their own setup, and of these respondents, 93 (17.49%) were nurses. (Table-1)

When asked whether they were encouraged by their colleagues to report any safety concerns that they may have in the OR, 377 (69.42%) agreed while 69 (12.7%) disagreed ($p<0.01$). Out of those who agreed, 67.5% were surgical consultants. On asking if it is difficult to speak up in the OR if the respondent

perceives a problem with patient care, 193 (35.54%) of the respondents agreed out of which 50% of the nurses shared the same opinion (Table-2).

When inquired whether the whole surgical unit works as a well-coordinated team, 298 (54.88%) of the respondents agreed to the statement, whereas 172 (31.67%) of them disagreed while 72 (13.2%) remained neutral ($p<0.01$). Disagreement was highest within the trainees with 42.4% expressing their discord ($p<0.01$).

The question regarding noncompliance of surgical safety protocols established for OR, 305 (56.16%) of OR personnel agree that there was disregard for surgical safety protocols, while 150 (27.62%) disagree and 87 (16.02%) stayed neutral ($p=0.071$). When the respondents were asked about WHO Surgical Safety Checklist (Figure-2), a great majority 436 (80.29%) of the respondents agreed that the Checklist would be easy to use, while only 57 (10.49%) disagreed and 48 (8.8%) remained neutral ($p<0.01$). From the total participants, 137 (25.23%) stated that the Checklist would take time to complete and hence delay surgery as opposed to 338 (62.24%) who disagreed with the notion- ($p<0.01$). Majority 494 (90.9%) was of the opinion that the Checklist would

improve operating room safety and 483 (88.95%) agreed that team communication could be improved through the Checklist and only 25 (4.6 %) disagreed ($p<0.05$).

When asked if the respondents would want the Checklist to be used if they were being operated upon, 514 (94.65%) respondents were of the view that the Checklist should be used, while only 14 (2.5%) and 14 (2.5%) chose to disagree and remain neutral, respectively ($p=0.625$). An overwhelming majority, 508 (93.55%) of the respondents were of opinion that checklist would prevent errors in the operating room, and just 16 (2.9%) disagreed ($p<0.05$).

On inquiring about the willingness of the respondents to implement the checklist, 521(95.94%) agreed to implement the checklist in their own OR.

In response to a related question regarding who should be responsible for filling the checklist, 256 (47.14%) felt that it was the surgeon's job, 71 (13.07%) believed it to be the anaesthetist's task and 152 (27.99%) stated that it should be the other members of the team (nurses, trainees etc.) and 62 (11.41%) were of the view that everyone should fill in their respective parts ($p<0.01$).

Table-1: Demographics of the participants.

Demographics	
Male	375 (69 %)
Female	168 (31 %)
Age Range	23–58 Years
Mean	40.5
SD	24.74
Specialty	N = number of respondents; Total N = 543
Surgery	110 (20.26 %)
Anesthesia	58 (10.68 %)
Trainees	132 (24.31%)
Technicians	125 (23.02 %)
Nurses	118 (21.73 %)
Experience in respective healthcare specialties	N = number of respondents; Total N = 543
<1 year	69 (12.71 %)
1-5 years	87 (16.02 %)
5 – 10 years	94 (17.31 %)
>10 years	293 (53.96 %)

Table 2: Operating room personnel response to statements regarding safety, attitude and SSSL Checklist

Statements	Agree %	Disagree %	p value
I would feel safe being treated here as a patient.	221 (40.69%)	239 (44.01)	<0.05
Briefing OR personnel before a surgical procedure is important for patient safety.	502 (92.44)	23 (4.2)	<0.05
I am encouraged by my colleagues to report any safety concerns I may have.	377 (69.42)	69 (12.7)	<0.01
In the ORs here, it is difficult to speak up if I perceive a problem with patient care.	193 (35.54)	263 (48.43)	>0.05
The physicians & nurses here work together as a well-coordinated team.	298 (54.88)	172 (31.6)	<0.01
Personnel frequently disregard rules or guidelines that are established for the OR.	305 (56.1)	150 (27.62)	>0.05
The checklist will be easy to use	436 (80.29)	57 (10.58)	<0.01
The check list will take a long time to complete & delay surgery.	137 (25.23)	338 (62.24)	<0.01
The check list will improve operating room safety.	497 (91.52)	28 (5.1)	<0.05
Communication will improve through use of check list.	483 (88.95)	25 (4.6)	<0.05
If I were having an operation, I would want the checklist to be used	514 (94.65)	14 (2.5)	>0.05
The check list will help prevent errors in the operating room.	508 (93.55)	23 (4.2)	<0.05
Will you like the checklist to be used in your operation theatre?	525 (96.68)	9 (1.6)	<0.05
Who should initiate/ fill the check list? Surgeon 256(47.14%) Anaesthetist 71 (13.07%) Others 152(27.99%) Individually 62 (11.41%)			<0.01

Before induction of aesthesia	Before skin incision	Before patient leaves operating room
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Has the patient confirmed his/her identity, site, procedure and consent?	<input type="checkbox"/> Confirm all team members have introduced themselves by name and role	Nurse verbally confirms: •Name of the procedure
<input type="checkbox"/> Is the site marked?	<input type="checkbox"/> Confirm the patient's name, procedure and where the incision will be made	<input type="checkbox"/> •Completion of instrument, sponge and needle counts
<input type="checkbox"/> Is the anesthesia machine and medication check complete?	<input type="checkbox"/> Has antibiotic prophylaxis been given within the last 60 minutes	•Specimen labeling
<input type="checkbox"/> Is the pulse oximeter on the patient and functioning?	Anticipated critical events	•Were there any equipment problems?
Does the patient have a:	•To surgeon	To Surgeon, Anesthetist and Nurse:
•known allergy	•What are the critical or non routine steps	<input type="checkbox"/> •What are the key concerns for recovery and management?
<input type="checkbox"/> •Difficult airway or aspiration risk	•How long will the case take?	
•Risk of >500 ml blood loss (7 ml per kg in kids)	<input type="checkbox"/> •Anticipated blood loss?	
	•To anesthetists	
	•Any patient specific concerns	
	•To Nursing team	
	•Has sterility been confirmed?	
	•Are there equipment issues or concerns?	
	<input type="checkbox"/> Is essential imaging displayed?	

Figure-1: 19-item surgical safety checklist adapted from WHO surgical safety checklist.

DISCUSSION

The administration of the Safety Attitude Questionnaire, across various surgical units at two tertiary care public sector hospitals in the metropolis of Karachi, was intended to reflect the environment of patient safety and teamwork climate within these establishments from the perspective of the healthcare personnel. The quantitative assessment of the prevalent attitudes between various hierarchal levels of the operating team and units, differences in teamwork and safety climate and their attitudes towards the Checklist were clearly identified.

Medicine, like aviation, maritime and space is considered to be a safety critical environment where the establishment and maintenance of a 'safety culture' is of utmost significance. An assessment of the same can be of paramount importance in gauging the attitudes and quality of performance of the team.^{15,16}

With respect to the prevalent practices to ensure safety culture in the operation theatres, almost half of these surgical unit members interviewed considered their own surgical setups and protocols unsafe. What is worth nothing is that the majority of the upper hierarchal surgical personnel such as surgeons and the anaesthetists and house officers wished not to be treated in

their own establishments, as compared to the nurses, who had less reservations. Lack of statistical information on the current safety climate in state run hospitals leaves little room for comparison, but an evaluation of the responses reveals that neither of the two surgical units have even marginally sufficient provisions to maintain safety standards as proposed by the protocols for surgical safety. A study reports 88.5% of surgical procedures observed in ten tertiary care hospitals in the city of Karachi, did not have a formal time out. The same study also reports that no formal count of sponges, needles and instruments were done in 21% of the observed surgeries.¹⁴

A similar survey on WHO Surgical Safety Checklist implementation in hospitals in Ethiopia also reported that 75% of the respondents felt that there was a need to improve surgical safety in their ORs before the implementation of the Checklist. The same survey also points out that the respondents found the 'time-out' section of the Checklist hardest to fill.¹⁷

It is reported that accidents usually result from the often-unanticipated combination of human and organizational failures when some weakness or gap exists in the system's barriers and safeguards.¹⁸ The Checklist requires a formal

pause in patient care at three critical moments during surgery: pre-operatively before anaesthesia is given, immediately before incision is given and post-operatively before the patient is taken out of the operating room. Centres that have implemented these guidelines have reported up to an 80% reduction in surgical complications and death.¹⁹ Moreover, data clearly supports the effectiveness of the safety Checklist in reducing deaths and the number of complications in a diverse clinical and economic setting.¹⁶

Effective communication among team members results in a decrease in morbidity and mortality, besides saving time and costs.²⁰ In our survey, most respondents were of the view that the Checklist will improve communication between the individuals in the team. Historically, communication problems have been reported between anaesthesiologist and surgeons or doctors and nurses.²¹ In our survey, we found that close to two-thirds of the respondents felt encouraged by their colleagues to report a safety concern. However, a majority of those were surgical consultants. 50% of the nurses found it difficult to speak if they perceive a problem with patient care. This highlights a strong autocratic hierarchical environment in the ORs which limits effective communication and threatens the safety culture.

A comparative study of attitudes of cockpit crews versus surgical staff towards teamwork and hierarchy showed that an overwhelming majority of the cockpit crew advocate flat hierarchies, while consultant surgeons demonstrate the steepest hierarchies.¹⁵ Data shows that teamwork climate is adversely affected due to a dearth of effective communication and commendation among team members which results in creating an unsuccessful safety culture and team spirit.²²

When asked about team coordination, only half of the respondents agreed that the nurses and physicians work as a well coordinate team at the two centres. This disagreement was significantly high amongst the house officers. One of the reasons may be because of the limited time house officers spend being part of the surgical team as each house officer rotates in the surgery service for a brief three-month period during their one-year internship. Another reason could be our medical and nursing school curriculums lacking the early and joint training of nurses and physicians to develop the knowledge, attitudes and skills necessary for teamwork.²⁰

The implementation of the Checklist is critical to the surgical units in Pakistan with

strong evidence from an academic training hospital in Canada showing a significant decrease in communication failures after implementation of the Surgical Safety Checklist.⁶

Most respondents agreed that the Checklist would improve surgical safety and reduce the margin for errors in the OR. The experience with aviation has shown that poor communication is not only the result of an obstinate captain, but due to poor threat and error management at the level of the team.¹⁵ Hence preventing error in our setup will require communication between every member of the team disregarding their position in the hierarchy. Almost half of the respondents in our survey felt that the surgeon should be the one initiating or filling the checklist. The response again highlights the underlying hierarchy system that exists in the surgical environment as nurses are may not be expected to take initiative in the presence of physicians.

The Safe Surgery Saves Lives (SSSL) initiative by the World Health Organization (WHO) is aimed at introducing and promoting surgical safety in ORs around the globe by implementing the Surgical Safety Checklist, which contains nineteen items.¹¹ Responses towards the implementation, efficacy and acceptance of the Checklist were highly promising with an early unanimous majority expressing keen interest in implementing the Checklist in their ORs. The WHO checklist has already proved its efficacy in a global population and the overwhelming majority would want it to be operational if they were undergoing surgery themselves.²³

The safety attitude, culture and checklist have been long used in the aviation industry from where it is adapted in medicine¹⁵. While significant progress has been made in the aviation industry to deal with error, in medicine, there is still an attitude towards covering mistakes and overlooking opportunities for improvement.¹⁵

Consistent with other underdeveloped countries, surgical care in Pakistan is dismal. Neglecting surgery and safe anaesthesia has led to countless deaths and disability. Physicians, researchers, policy makers, and the government health care system must engage and commit to provide access to emergency, essential, and safe surgical care.

With strong evidence supporting the use of the World Health Organization's Surgical Safety Checklist, an effective strategy is needed to establish the necessary surgical standards by intervention in a low resource and high-volume

setting such as the two public hospitals we included in our pilot study in Pakistan. Use of the World Health Organization's Surgical Safety Checklist has been associated with a significant reduction in major postoperative complications after inpatient surgery, and it is hypothesized that implementing the checklist would generate cost savings for hospitals.

A pre and post implementation study should be done at the earliest to assess the knowledge, attitude and practices of the untrained versus trained personnel and the reduction in the number of surgical complications and death. Observational data should also be collected on the number of communication failures in the OR before and after implementation of the Checklist.

The successful implementation of the Checklist in other centres around the world required extensive efforts to enlist local leaders, educate staff in the benefits of adopting the Checklist, train personnel through multiple workshops, observe and reinforce the training during the initial phase and perform follow up checks. Success in low resource areas is more challenging as institutional hierarchies and resource limitations are more pronounced.

With the Lancet Commission on Global Surgery pushing for greater access to surgical and anaesthesia care in the developing countries, a significant change in healthcare policy is expected in the lower middle-income countries to address the projected increase in road traffic injuries, cancer, cardiovascular and metabolic diseases through 2030. The goal is to provide safe, essential, life-saving surgical and anaesthesia care in the LMICs. The Surgical Safety Checklist implementation in Pakistan will play a pivotal role in surgical outcomes in the future.

CONCLUSION

Operation room personnel were not aware of several important areas related to briefing, communication, safety attitude, following standard protocols and use of WHO Surgical Safety check list. A pre-post intervention study should be conducted after formal introduction of the Checklist. Successful implementation will require taking all stake holders on board and rigorous training workshops, reinforcing and revisiting.

AUTHORS' CONTRIBUTION

MSM and MM conceived, designed and did statistical analysis and editing of manuscript. MM and JE did data collection and manuscript

writing. MSM did review and final approval of manuscript.

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