

ORIGINAL ARTICLE

Analysis of Compliance of Surgical Safety Protocols in Operating Rooms of Tertiary Care Hospitals of Lahore

Javeria Usman¹, Usman Mahboob²

ABSTRACT

Background: Proper application and compliance of surgical safety protocols (SSP) decreases morbidity and mortality. Nonetheless, data on compliance of SSP is limited in Pakistan.

Aim: The aim of our study was to analyze of compliance of surgical safety protocols in operating rooms of tertiary care hospitals of Lahore

Methods: A cross-sectional study of 178 health care providers including surgeons and other OT related staff was conducted in four tertiary care hospitals of Lahore within a time period of two months, based on convenient sampling. A pre-validated questionnaire (with 5-point Likert scale, 1 strongly disagree and 5 strongly agree) was distributed among the health care professionals after taking consent. Data was then analyzed on SPSS 21.

Results: A total of 178 health care providers took part in our study. Among the respondents, 61.8% needed to improve their compliance of SSP; whereas 38.2% had good compliance. Regarding safety climate 55.6% had good safety climate of operative rooms (ORs) and 44.4% needed improvement. Regarding teamwork environment, 43.3% reported to have a good teamwork environment but 56.7% needed improvement. Our study found a statistically significant association between safety climate of ORs and adoption of SSP ($p < 0.001$). A statistically significant association was also found between teamwork climate and compliance of SSP ($p < 0.001$).

Conclusion: The results suggest that most of the health care professionals in tertiary care hospitals of Lahore are not aware of SSP, WHO surgical safety checklist (SSCL) and its implementation in ORs. WHO SSCL, is not currently in use in greater number of the ORs? Majority of the OR personnel did not receive any training regarding the use of safety checklist.

Keywords: *surgical safety, operation rooms, WHO SSCL.*

Introduction: Surgical care is the basic constituent of health care and the estimated volume of surgical procedures performed annually is around 313 million (Meara et al., 2015).

There is 0.4 to 0.8% death rate and a complication rate of 3-17% in perioperative period in developed countries (Haynes et al., 2009).

Fifty percent of these accidents can be avoided by strictly implementing SSP (de Vries, Ramrattan, Smorenburg, Gouma, & Boermeester, 2008). In past multiple attempts were made to

avoid the surgical complications due to errors and negligence. (Cima et al., 2009; Michaels et al., 2007). The published literature emphasize that, surgical results are highly altered by following the surgical protocols and working environment and communication between the members of the surgical team (Paige, Aaron, Yang, Howell, & Chauvin, 2009), pre-operative briefings to the whole team (Lingard et al., 2008) and an organized team work. The safety attitude questionnaire (SAQ) is a universal standardized assessment device to test patient's safety at a surgical center (Relihan, Glynn, Daly, Silke, & Ryder, 2009). The greatest evident attempt at reducing the peri-operative complications was made by World Health Organization (WHO), in the form of guidelines by the name of SSCL (Safety & Organization, 2009). Published studies report that implementation of WHO SSCL reduces the morbidity and mortality worldwide (Haynes et al., 2009). The perioperative death rate of patients in Pakistan is higher than developed countries (Ahmed, Aurangzeb, Alam, Khitab, & Zarin, 2008), leading to lack of faith on the surgical skills of surgeons and OR staff.

1. Department of Surgery, University College of Medicine & Dentistry, University of Lahore

2. Department of Health Professions Education and Research, Khyber Medical University, Pakistan

Correspondence: Javeria Usman
javeriausman93@gmail.com

Funding source: NIL; Conflict of interest: NIL

Received: July 5th, 2019; Accepted: August 8th, 2019

The rationale of this study is to analyze the compliance towards surgical safety among the health care professionals and to increase their acquaintance towards the significance of patient's safety and adequate application of WHO SSCL in order to save precious lives and lay the foundation of a concrete, safe healthcare system for Pakistan.

Methods: A cross-sectional study of 178 healthcare providers including General surgeons, Orthopedic Surgeons, Gynecologists, anesthetists, staff nurses and other operating room related personnel was conducted in four tertiary care hospitals of Lahore (Nawaz Sharif Social Security Hospital, Jinnah hospital, Services Hospital Lahore and Mayo Hospital Lahore) to analyze the compliance of surgical safety protocols in operating rooms of tertiary care hospitals of Lahore. We also analyzed the associations between experience of health care providers, Teamwork climate, Safety climate and compliance to surgical safety protocols in operating rooms of tertiary care hospitals of Lahore. A pre-validated questionnaire was used that incorporated relevant questions regarding WHO surgical safety checklist and safety culture and teamwork climate components of safety attitude questionnaire (SAQ). The cutoff point having "good" teamwork climate and safety climate was set as 60%, and "need to improve" was below 60% of the total score. The questionnaire also requested some other information, such as age, gender, discipline, previous trainings regarding surgical safety protocols, CME credit hours and background experience.

The questionnaire was delivered to the target population by researcher herself along with the information form stating the introduction of the researcher and the objectives of the study. The questionnaire was delivered to the departments of General Surgery, Orthopedics, Gynae & Obstetrics, Anesthesia, Nurses and operation theatre (OT) Technicians. A consent was taken from each respondent before delivering the questionnaire. The participants were assured that their responses will remain confidential.

Data was analyzed using SPSS version 21. Descriptive statistics were used to present frequencies and percentages. Cross-tabulations were performed to get relations between study variables, experience of the health care providers, teamwork climate and safety climate. Chi-square test was used to determine associations between teamwork climate, safety climate and observing surgical safety protocols. A p-value of <0.05 was considered statistically significant.

Results: A total of 178 health care providers working in operation theatres took part in our study, out of which 46 (25.8%) participants were from Nawaz Sharif social security Hospital, 39 (21.9%) from Jinnah Hospital Lahore, 43 (24.2%) from Services Hospital and 50 (28.1%) were from Mayo Hospital

Lahore. Majority of the participants (85.4%) were less than 40 years of age and 26 (14.6%) were of the age of more than 40 years. There were 104 (58.4%) males and 74 (41.6) females. The ages ranged between 22 to 67 years. There were 62 (34.8%) General Surgeons, 15 (8.4%) Orthopedic Surgeons, 33 (18.5%) gynecologists, 16 (9.0%) Anesthetists, 24 (13.5%) nurses and 28 (15.7%) OT Technicians. There were 24 (13.5%) consultants and 101 (56.7%) trainees.

One hundred and eight participants (60.7%) had an experience of 1-5 years and 70 (39.3%) had an experience of 6 years and above.

Our study found that majority of the respondents (61.8%) needed to improve their compliance to surgical safety protocols, whereas 38.2% had good compliance. Regarding safety climate, 55.6% reported to have good safety climate of operative rooms and 44.4% needed improvement. Regarding teamwork environment 43.3% reported to have a good teamwork environment but 56.7% needed improvement. The participants' response to different statements is shown in Table 1.

Majority of the participants (82.6%) were not well aware of WHO Surgical Safety Check list. Most of the respondents (76.4%) reported that WHO SSCL in not used in their operating rooms and 94.4% wanted the WHO SSCL to be used in their set up. A large number of participants (90.4%) also agreed that using WHO SSCL will decrease complications and mortality in surgical patients and 94.9% was of the opinion that it will improve the communication in operating rooms.

Table 1: Responses of healthcare providers regarding, safety, Teamwork and SSCL

Statements	Agree		Disagree	
	Frequency	Percent	Frequency	Percent
The doctors and nurses in this OR work together as a well-coordinated team	146	82.0	32	18.0
In this OR, it is difficult to speak up if I perceive a problem with patient care	111	62.4	67	37.6
I have the support I need from other personnel to care for patients	128	71.9	50	28.1
I am well aware of the WHO surgical safety check list and its effects on safe surgery	31	17.4	147	82.6
It is easy in this OR to ask questions when there is something, I don't understand	117	65.7	61	34.3
I am encouraged by my colleagues to report any patient safety concerns I may have	142	79.8	36	20.2
I know the proper channels to direct questions regarding patient safety in this OR	93	52.2	85	47.8
I would feel safe being treated here as a patient	73	41.0	105	59.0
The levels of staffing in this OR are sufficient to handle the number of patients	35	19.7	143	80.3
WHO SSCL is currently in use in my OR	42	23.6	136	76.4
I favor the checklist to be used in my operation theatre	168	94.4	10	5.6
The checklist will be easy to use	143	80.3	35	19.7
Using the checklist in ORs will decrease complications, morbidity & mortality of surgical patients	161	90.4	17	9.6
Using the checklist will improve communication in OR	169	94.9	9	5.1
If I were having an operation, I would want the checklist to be used	156	87.6	22	12.4
Completing the checklist is time taking and will lead to delay in surgeries	58	32.6	120	67.4
Introduction of the team members and briefing about the surgical procedure to the team is important for patient's safety	161	90.4	17	9.6
Recovery from anesthesia and immediate postoperative management is the sole responsibility of anesthetist	84	47.2	94	52.8
I have received trainings on how to use WHO SSCL	35	19.7	143	80.3
I have an easy access to CME courses	32	18.0	146	82.0
Completing the checklist in OR is the responsibility of:				
Surgeon	24	13.5	154	86.5
Anesthetist	22	12.4	156	87.6
Staff nurse	47	26.4	131	73.6
Assistant / trainee	20	11.2	158	88.8
All of the above	66	37.1	112	62.9

Completing checklist is time taking and will delay the surgeries was considered by 32.6%. greater number (80.3%) of participants denied receiving any training to use WHO SSCL and 82% (146) reported that they do not have an easy access to CME courses. More than half (62.4%) of the respondents agreed that it is difficult for them to speak up if they have any problem regarding patient's care and safety and 59% did not feel safe to be operated in their own set up. Our study found a statistically significant association ($p < 0.001$) between safety climate of operation theatres, teamwork environment and adoption of surgical safety protocols.

Table 2: Association between safety climate, teamwork climate and adoption of surgical safety protocols

	Adopting surgical safety protocols	Not adopting surgical safety protocols	
Good safety climate	58.6%	41.4%	P < 0.001
Safety climate not up to the mark	12.7%	87.3	
Good teamwork climate	75.3%	24.7%	P < 0.001
Teamwork climate not up to the mark	9.9%	90.1%	

Contrary to our expectations, our study found that 36.1% of respondents with less than 6 years of experience were using WHO Surgical Safety Checklist in their operating rooms, whereas only 3% of respondents with experience greater than 6 years were compliant with surgical safety checklist.

Discussion: Surgery holds one of the essential place in health care system worldwide (Weiser et al., 2008). Avoidable injury occurs daily during surgeries globally. The mortality resulting from surgical ailments is greater than the deadly diseases well-known to the world like tuberculosis, AIDS, diarrheal diseases and some pediatric infections (Zafar & McQueen, 2011).

Unfortunately, no reliable local data regarding the bulk and quality of surgeries, as well as the rate of deaths and complications in peri-operative period, is available; indicating the gloomy image of patient's safety and healthcare in the country. Developing countries like Pakistan, should endorse surgical ailments as a leading public health concern and prioritize collecting different

data and publish statistics regarding morbidity and mortality resulting from surgical diseases.

Our study found a compliance of 38.2% to surgical safety protocols, which is more than the compliance reported by Sayinthen Vivekanantham et al in developing countries (Vivekanantham, Ravindran, Shanmugarajah, Maruthappu, & Shalhoub, 2014). Another study reported a similar compliance rate, that is 39.7% (Melekie & Getahun, 2015).

As in aviation and space, the field of surgery requires safety concerns, demanding development and maintenance of "safety climate". Evaluation of the safety climate is of utmost importance in determining the approach and goal achieving attitude of the team (Sexton, Thomas, & Helmreich, 2000) Relating to the current safety climate in operating rooms, almost half of the respondents reported lack of faith in their own system. A local study reported 88.5% surgical procedures lacking time out, and no formal counting of sponges, needles and instruments in 21% of cases (Toor, Nigh-e-Mumtaz, Syed, Yousuf, & Syeda, 2013) In our study, 55.6% of the respondents reported to have a good safety climate. This is contrary to the percentage reported by Ping Zhou et al, that is 7.45% (Zhou, Li, Wei, Zhu, & Xue, 2017) It has been suggested to measure the safety climate of health care organizations in order to rate their quality structure (Pronovost & Sexton, 2005), but unfortunately no such trend exists in Pakistan.

Many professions comprise the operative room team, making the communication and team work vital for patient's safety (Weller & Boyd, 2014). It is proven by research that 70-80% of harm in health care is caused by faulty communication and team work. (Bleakley, Allard, & Hobbs, 2012). In addition to preserving time and expense, productive teamwork reduces complications and death (Davies, 2005). In our study, 43.3% of respondents reported good teamwork climate, where as a Swedish study reported 65% (Erestam, Haglind, Bock, Andersson, & Angenete, 2017). Sadly, no local study could be found to make a comparison with. More than half of the nurses and junior doctors reported that, they find it difficult to speak up if they get a problem with patient care. This indicates a dominating and bossy attitude by seniors in ORs, making communication and teamwork difficult. Similar results were observed in a comparative study between a cockpit crew and surgical staff regarding teamwork and hierarchy (Sexton et al., 2000)

In our study, 82.6% of healthcare providers in our study reported their lack of awareness regarding WHO SSCL, while 80.3 % admitted of not receiving any training about how to use WHO SSCL. Surgical centers that have properly implemented the checklist have reported 80% decrease in surgical morbidity and mortality (Mazzocco et al., 2009). The introduction and

implementation of SSCL in Pakistan is crucial. Feedback towards acknowledgement and application of checklist was very encouraging with majority of the participants showing interest in employing the checklist in their operating rooms. similar responses has been observed around the world(Senior, 2009).

Our study found a statistically significant association between safety climate of operation theatres and adoption of surgical safety protocols. Participants who reported having good safety climate also reported use of WHO SSCL. Similarly, implementation of SSCL strengthens safety culture. Similar findings have been observed by Hill M et al (Hill, Roberts, Alderson, & Gale, 2015) and Jon Allard et al(Allard, Bleakley, Hobbs, & Coombes, 2011). However, Haugen et al reported a minor effect on safety culture due to employment of SSCL in Operating rooms(Haugen et al., 2013).

Surgery, in itself is a team activity. Communication and teamwork are the vital pillars of a safe and successful surgery. A statistically significant association was found between teamwork climate and compliance of surgical safety protocols in our study. Similar results were reported by Haynes et al (Haynes et al., 2011) and Kawano et al(Kawano, Taniwaki, Ogata, Sakamoto, & Yokoyama, 2014).Unexpectedly, we observed in this study that majority of the consultants with greater experience were not using SSCL in their operating rooms, while trainees and junior doctors had a positive attitude. This may be due to the fact that the experienced consultants consider the checklist as modifying their routine practice in ORs, which they have followed lifelong and defying their expert judgment This is contrary to the observations reported by another study (Vohra, Cowley, Bhasin, Barakat, & Gough, 2015) where consultant surgeons working in university hospitals were using the checklist in greater numbers than junior doctors.

As the Lancet Commission on Global Surgery(Meara et al., 2015)is urging for better approach for surgical care in developing countries and expecting a change in health care policy achieving a goal of safe and indispensable surgical and anesthesia care in Lower Middle Income Countries (LMICs); the introduction and implementation of SSCL in critical care areas of Pakistan will play a central role in achieving the goal.

Conclusion: This study highlights that the safety of surgical patients in ORs in the hospitals observed is disappointing. Most of the health care professionals in tertiary care hospitals of Lahore are not aware of SSP, WHO SSCL and its implementation in ORs. World Health Organization's SSCL is not currently in use in greater number of operation theatres. Majority of the OR personnel did not receive any training regarding the use of WHO surgical safety checklist (SSCL).

Declaration of interest:

The authors report no conflict of interest.

Author's contribution:

- Javeria Usman: Conception and design of the work; & the acquisition, analysis, & interpretation of data for the work
- Usman Mahboob: Critical Review and final approval of the version to be published

References:

- Ahmed, N., Aurangzeb, M., Alam, K., Khitab, N., & Zarin, M. (2008). Surgical audit with risk adjusted mortality rates using the POSSUM scoring system. *Pak J Surg*, 24, 163-167.
- Allard, J., Bleakley, A., Hobbs, A., & Coombes, L. (2011). Pre-surgery briefings and safety climate in the operating theatre. *BMJ Quality & Safety*, 20(8), 711-717.
- Bleakley, A., Allard, J., & Hobbs, A. (2012). Towards culture change in the operating theatre: embedding a complex educational intervention to improve teamwork climate. *Medical teacher*, 34(9), e635-e640.
- Cima, R. R., Kollengode, A., Storsveen, A. S., Weisbrod, C. A., Deschamps, C., Koch, M. B., . . . Pool, S. R. (2009). A multidisciplinary team approach to retained foreign objects. *The Joint Commission Journal on Quality and Patient Safety*, 35(3), 123-132.
- Davies, J. (2005). Team communication in the operating room. *Acta anaesthesiologica scandinavica*, 49(7), 898-901.
- de Vries, E. N., Ramrattan, M. A., Smorenburg, S. M., Gouma, D. J., & Boermeester, M. A. (2008). The incidence and nature of in-hospital adverse events: a systematic review. *BMJ Quality & Safety*, 17(3), 216-223.
- Erestam, S., Haglind, E., Bock, D., Andersson, A. E., & Angenete, E. (2017). Changes in safety climate and teamwork in the operating room after implementation of a revised WHO checklist: a prospective interventional study. *Patient safety in surgery*, 11(1), 4.
- Haugen, A. S., Sjøfteland, E., Eide, G. E., Sevdalis, N., Vincent, C. A., Nortvedt, M. W., & Harthug, S. (2013). Impact of the World Health Organization's Surgical Safety Checklist on safety culture in the operating theatre: a controlled intervention study. *British journal of anaesthesia*, 110(5), 807-815.

- Haynes, A. B., Weiser, T. G., Berry, W. R., Lipsitz, S. R., Breizat, A.-H. S., Dellinger, E. P., . . . Lapitan, M. C. M. (2011). Changes in safety attitude and relationship to decreased postoperative morbidity and mortality following implementation of a checklist-based surgical safety intervention. *BMJ Quality & Safety*, 20(1), 102-107.
- Haynes, A. B., Weiser, T. G., Berry, W. R., Lipsitz, S. R., Breizat, A.-H. S., Dellinger, E. P., . . . Lapitan, M. C. M. (2009). A surgical safety checklist to reduce morbidity and mortality in a global population. *New England Journal of Medicine*, 360(5), 491-499.
- Hill, M., Roberts, M., Alderson, M., & Gale, T. (2015). Safety culture and the 5 steps to safer surgery: an intervention study. *BJA: British Journal of Anaesthesia*, 114(6), 958-962.
- Kawano, T., Taniwaki, M., Ogata, K., Sakamoto, M., & Yokoyama, M. (2014). Improvement of teamwork and safety climate following implementation of the WHO surgical safety checklist at a university hospital in Japan. *Journal of anesthesia*, 28(3), 467-470.
- Lingard, L., Regehr, G., Orser, B., Reznick, R., Baker, G. R., Doran, D., . . . Whyte, S. (2008). Evaluation of a preoperative checklist and team briefing among surgeons, nurses, and anesthesiologists to reduce failures in communication. *Archives of surgery*, 143(1), 12-17.
- Mazzocco, K., Petitti, D. B., Fong, K. T., Bonacum, D., Brookey, J., Graham, S., . . . Thomas, E. J. (2009). Surgical team behaviors and patient outcomes. *The American Journal of Surgery*, 197(5), 678-685.
- Meara, J. G., Leather, A. J., Hagander, L., Alkire, B. C., Alonso, N., Ameh, E. A., . . . Davies, J. (2015). Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development. *The Lancet*, 386(9993), 569-624.
- Melek, T. B., & Getahun, G. M. (2015). Compliance with surgical safety checklist completion in the operating room of University of Gondar Hospital, Northwest Ethiopia. *BMC research notes*, 8(1), 361.
- Michaels, R. K., Makary, M. A., Dahab, Y., Frassica, F. J., Heitmiller, E., Rowen, L. C., . . . Pronovost, P. J. (2007). Achieving the National Quality Forum's "Never Events": prevention of wrong site, wrong procedure, and wrong patient operations. *Annals of surgery*, 245(4), 526.
- Paige, J. T., Aaron, D. L., Yang, T., Howell, D. S., & Chauvin, S. W. (2009). Improved operating room teamwork via SAFETY prep: a rural community hospital's experience. *World journal of surgery*, 33(6), 1181-1187.
- Pronovost, P., & Sexton, B. (2005). Assessing safety culture: guidelines and recommendations: BMJ Publishing Group Ltd.
- Relihan, E., Glynn, S., Daly, D., Silke, B., & Ryder, S. (2009). Measuring and benchmarking safety culture: application of the safety attitudes questionnaire to an acute medical admissions unit. *Irish journal of medical science*, 178(4), 433.
- Safety, W. P., & Organization, W. H. (2009). WHO guidelines for safe surgery: 2009: safe surgery saves lives: Geneva: World Health Organization.
- Senior, K. (2009). WHO Surgical Safety Checklist has value worldwide. *The Lancet Infectious Diseases*, 9(4), 211.
- Sexton, J. B., Thomas, E. J., & Helmreich, R. L. (2000). Error, stress, and teamwork in medicine and aviation: cross sectional surveys. *Bmj*, 320(7237), 745-749.
- Toor, A. A., Nigh-e-Mumtaz, S., Syed, R., Yousuf, M., & Syeda, A. (2013). Surgical safety practices in Pakistan. *Breast*, 8, 7.7.
- Vivekanantham, S., Ravindran, R. P., Shanmugarajah, K., Maruthappu, M., & Shalhoub, J. (2014). Surgical safety checklists in developing countries. *International journal of surgery*, 12(1), 2-6.
- Vohra, R. S., Cowley, J. B., Bhasin, N., Barakat, H. M., & Gough, M. J. (2015). Attitudes towards the surgical safety checklist and factors associated with its use: A global survey of frontline medical professionals. *Annals of Medicine and Surgery*, 4(2), 119-123.
- Weiser, T. G., Regenbogen, S. E., Thompson, K. D., Haynes, A. B., Lipsitz, S. R., Berry, W. R., & Gawande, A. A. (2008). An estimation of the global volume of surgery: a modelling strategy based on available data. *The Lancet*, 372(9633), 139-144.
- Weller, J., & Boyd, M. (2014). Making a difference through improving teamwork in the operating room: A systematic review of the evidence on what works. *Current Anesthesiology Reports*, 4(2), 77-83.
- Zafar, S. N., & McQueen, K. K. (2011). Surgery, public health, and Pakistan. *World journal of surgery*, 35(12), 2625-2634.
- Zhou, P., Li, M., Wei, X., Zhu, H., & Xue, D. (2017). Patient Safety Climate in General Public Hospitals in China: A Multiregion Study. *Journal of patient safety*.