BJMS
Borneo Journal of Medical Sciences

ORIGINAL ARTICLE

A Knowledge Assessment of the Surgical Safety Checklist among Operating Room Nurses in Malaysia

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Received: 14 May 2024

Accepted: 31 July 2024

Published: 2 September 2024

DOI: https://10.51200/bjms.v18i3.5368

Keywords: *Surgical safety checklist, Operating room nurses, Awareness, Malaysia*

ABSTRACT

Surgical complications present a significant challenge worldwide. To address this issue, the World Health Organisation (WHO) introduced the Surgical Safety Checklist (SSC) as a means to decrease complications and fatalities during surgery. Nurses play a critical role in ensuring patient safety throughout the operation. A clear understanding of the checklist promotes effective communication within the surgical team, fosters a safety culture, and reduces complications. However, limited research has been conducted in accessing knowledge of operating room (OR) nurses regarding SSC, especially in the context of Malaysian healthcare. Therefore, this study was conducted to evaluate the level of knowledge of SSC among OR nurses in Malaysia. A quantitative approach with a descriptive design was used, involving ninety (90) OR nurses from Sultan Ahmad Shah Medical Centre (SASMEC@IIUM). The nurses completed a self-administered questionnaire and the results revealed good knowledge of the preoperative phase checklist (68.9%), intraoperative phase checklist (73.3%), and postoperative phase checklist (77.8%). However, a minority of nurses (around 20–30% across three different phases) needed improvement. This study suggests that the SSC has been effectively implemented at SASMEC@IIUM. However, it also emphasises the importance of ongoing education to ensure that all nurses have a thorough understanding of the checklist.

INTRODUCTION

Surgical procedures are essential to healthcare worldwide, but they come with risks. Each year, over 310 million surgical procedures are performed globally. There are varying estimates of morbidity and mortality, but recent data suggests that around 75 million patients experience postoperative complications, resulting in two million deaths annually. While surgeries are meant to save lives, complications can arise, with mortality rates ranging from 0.5% to 5% following major surgery, and up to 25% of patients experiencing complications after surgery (Abbott et al., 2018; Gong et al., 2021). These risks emphasize the need for patient safety measures in the operating room (OR).

One effective intervention to enhance surgical safety is the Surgical Safety Checklist (SSC). Checklists provide a simple and standardised approach to certain aspects of patient care. The World Health Organization (WHO) surgical safety checklist is the most commonly used checklist, consisting of 19 items across three domains: before anaesthesia induction, before surgical incision, and before the patient leaves the operating theatre. The "WHO Surgical Safety Checklist" is implemented globally to ensure patient safety during surgery and has shown potential in reducing surgical complications and mortality rates. The checklist improves patient safety, promotes interdisciplinary communication, and prevents avoidable complications by emphasizing existing safety procedures (Rego, 2019).

The SSC is a standardized tool that facilitates communication and verification of crucial steps throughout the surgical process, including the preoperative, intraoperative, and postoperative phases (Narayan, 2023). Studies have demonstrated that proper utilization of the SSC can significantly decrease surgical complications and shorten hospital stays (Barimani et al., 2020; Schwendimann et al., 2019).

The occurrence of surgical complications continues to pose a serious global concern, as preventable mistakes contribute significantly to illness and death (Dobson, 2020). The effectiveness of Surgical Safety Checklists (SSCs) in improving surgical outcomes and enhancing patient safety relies heavily on the understanding and proper execution by healthcare workers, including operating room (OR) nurses. The World Health Organisation (WHO) implemented the Surgical Safety Checklist to reduce the incidence of illness and death associated with surgical procedures. This is accomplished by establishing standardized safety checks that are performed before, during, and after surgery (Rego, 2019). However, obstacles to the implementation and regular use of SSCs may arise due to various factors, such as the level of knowledge and opinions held by operating room personnel (Wyss et al., 2023; Munthali et al., 2022).

Understanding the level of awareness among operating room nurses is crucial for several reasons. Firstly, nurses play a vital role in ensuring patient safety throughout the entire surgical process. Their knowledge and understanding of the SSC enable them to actively participate in completing checklists and raise any concerns as necessary (Chellam & Arulappan, 2023). Additionally, a comprehensive understanding of the checklist promotes effective communication among the surgical team, fosters a safety-oriented environment, and reduces the likelihood of errors (Abbott et al., 2022).

Previous research has highlighted the importance of support and active involvement from the surgical team, with nurses playing a critical role in the effectiveness of Surgical Safety Checklists (Urban et al., 2021). Despite confirming the benefits of SSCs, there is a lack of studies specifically examining the level of awareness among OR nurses regarding these checklists, particularly within the healthcare

system of Malaysia.

This study aimed to assess the knowledge level of operating room nurses at Sultan Ahmad Shah Medical Centre (SASMEC) in Pahang, Malaysia, regarding Surgical Safety Checklists. The findings will provide valuable insights into the current implementation status of SSCs within the hospital and guide specific initiatives to enhance their effectiveness in maintaining patient safety. Furthermore, the results of this study have the potential to inform legislative modifications and educational initiatives aimed at improving surgical safety measures in Malaysia.

MATERIALS AND METHODS

Research Methodology and Location

This study employed a quantitative, descriptive cross-sectional design. Data were collected from operating room (OR) nurses at Sultan Ahmad Shah Medical Centre (SASMEC), Pahang, Malaysia, between April and July 2023.

Sampling and Participants

The sample size for this study was calculated using Raosoft software. The recommended sample size was determined to be 90 participants from a total population of 117 OR nursing staff at Sultan Ahmad Shah Medical Centre (SASMEC), located in Kuantan, Malaysia. The calculation was conducted with a margin of error of 5%, a confidence level of 95%, and a response distribution of 50%.

The study's inclusion criteria consisted of OR nurses employed at SASMEC with a minimum of six months of experience, possessing any level of nursing-related education (diploma, degree, diploma with post-basic, degree with post-basic, master, and PhD), and expressing a willingness to participate in the research. On the other hand, the exclusion criteria included nurses who worked outside of SASMEC, individuals with less than six months of experience, those without a nursing-related educational background, and those who were not willing to participate in the study.

Data Collection and its Tools

The objective of this study was to assess the knowledge of the surgical safety checklist (SSC) among operating room (OR) nurses at SASMEC. Printed questionnaires in English were used for data collection. These questionnaires were adapted from the World Health Organisation's (WHO) surgical safety checklist (SSC), SASMEC's perioperative checklist, and guidelines provided by the Malaysian Ministry of Health (KKM) (Patient Safety Unit, Ministry of Health Malaysia, 2018). The questionnaire was designed to align with these sources and cover the preoperative, intraoperative, and postoperative stages of the surgical safety checklist. To ensure accuracy and relevance, a panel of experts, including an OR nurse educator, a surgeon, and a methodologist, thoroughly reviewed the questionnaire. A pilot test was conducted on a separate sample of twenty-seven (27) operating room nurses at a different hospital to assess the questionnaire's reliability. The internal consistency of the data was evaluated using Cronbach's Alpha coefficient, resulting in a value of 0.973, indicating a high level of reliability.

The survey instrument was divided into four sections. Part A collected information on the sociodemographic characteristics of the participants. Part B aimed to assess the level of knowledge among nurses regarding the preoperative phase checklist. This assessment utilised a Likert scale consisting of 10 items, with a score of 5 indicating strong agreement and a score of 1 indicating significant disagreement. The maximum score achievable for part B was 50. Part C investigated nurses' knowledge of the intraoperative phase checklist using a Likert scale consisting of 4 items with a maximum score of 20. Part D assessed knowledge of the postoperative checklist using a Likert scale consisting of 4 items, with a maximum score of 20.

The data collection process involved approaching OR nurses at Sultan Ahmad Shah Medical Centre (SASMEC) who met the specific inclusion criteria and obtaining the required sample size. After obtaining informed consent, the researchers provided a detailed explanation of the study and gave participants the choice to withdraw their participation. Subsequently, participants individually completed the entire questionnaire. Throughout this process, researchers were available to address any inquiries. Once completed, the surveys were collected, and participants were thanked for their participation.

Data Analysis

The data analysis was conducted using IBM SPSS Statistics version 27.0 software. Descriptive statistics were used to summarise the collected data. Total scores were calculated for Parts B, C, and D of the questionnaire, which assessed knowledge of the preoperative, intraoperative, and postoperative phases, respectively. A score of 48 or higher out of 50 on Part B indicated a high level of knowledge of the preoperative checklist, while a score below 48 indicated a need for improvement. Similarly, a perfect score on the 20-point Parts C and D indicated a high level of knowledge of the respective intraoperative and postoperative checklists, while scores below the maximum suggested areas for improvement.

Ethical Considerations

Before the study began, ethical approval was obtained from the relevant authorities at SASMEC and the IIUM ethical committee with reference number IREC 2022-KON/72. Participation was voluntary, and informed consent was obtained from all participants. The data's anonymity and confidentiality were ensured throughout the research process.

RESULT

Part I: Socio-demographic Data of Participants

The participants' socio-demographic characteristics were analysed to gain insights into the sample composition. Table 1 summarises the distribution of participants based on their age, gender, years of experience, and educational level.

Table 1: Sociodemographic data of participants (n=90)

Variables		Frequency (n)	Percentage (%)
Age	21-25 years old	5	5.6
	26-30 years old	15	16.7
	>30 years old	70	77.8
Gender	Female	73	81.1
	Male	17	18.9
Race	Malay	88	97.8
	Chinese	2	2.2
Marital status	Single	12	13.3
	Married	76	84.4
	Divorcee	2	2.2
Educational background	Diploma	69	76.7
	Diploma with Post-basic	14	15.5
	Degree	6	6.7
	Degree with post-basic	1	1.1
Years of working	6 months – 1 year	1	1.1
	1 year – 3 years	10	11.1
	>3 years	79	87.8

Most respondents were older than 30 years old, with 70 out of 90 respondents (77.8%). Out of these respondents, 73 (81.1%) were female, while the remaining respondents were male. Most of the respondents were Malay, accounting for 88 respondents (97.8%), with only two respondents being Chinese (2.2%). Among the respondents, 76 (84.4%) were married, outnumbering the single respondents (12 or 13.3%) and the divorced respondents (2 or 2.2%). In terms of educational background, most of the respondents (69 or 76.7%) held a diploma, while 14 respondents (15.5%) had a diploma with post-basic qualifications. Only 6 respondents (6.7%) possessed a degree certification, and there was only one

respondent (1.1%) who held a degree with post-basic qualifications. Additionally, just one respondent (1.1%) had been working as an OR nurse for 6 months to 1 year. On the other hand, many of the respondents (79 or 87.8%) had been working as operation room (OR) nurses for more than 3 years, with the remaining respondents having worked between 1 year and 3 years in this role.

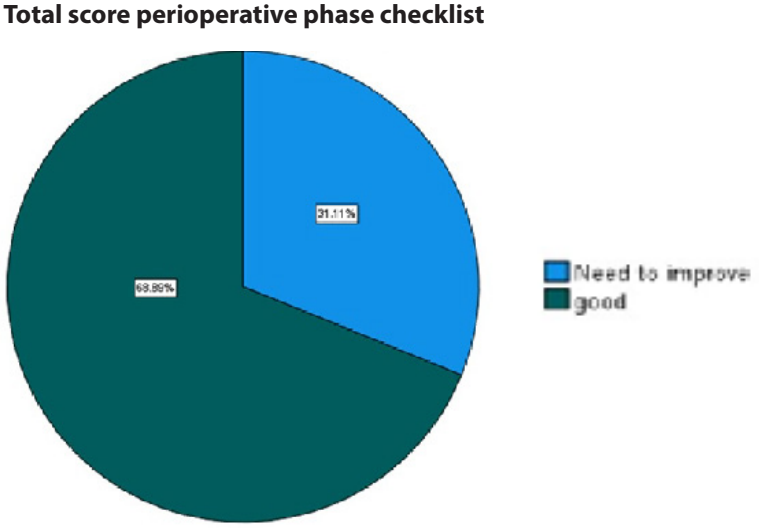

Figure 1: Level of knowledge on the perioperative checklist of SSC among OR nurses

Part II: Level of Knowledge on Preoperative Checklist of SSC

The participant's level of knowledge regarding the preoperative checklist of the Surgical Safety Checklist (SSC) was assessed. Table 2 presents the distribution of responses to the preoperative checklist items.

Table 2: The Level of Knowledge on the Perioperative Checklist of SSC

Variables	Total score	Frequency (n)	Percentage (%)
Knowledge of the OR nurse			
Good	48-50	62	68.9
Need to improve	10-47	28	31.1

The data showed that 62 (68%) of the respondents had a good understanding of the preoperative checklist for the Surgical Safety Checklist (SSC). However, 28 of them (31.1%) still needed to improve their knowledge regarding the preoperative checklist. It is shown in Figure 1. Overall, participants demonstrated a high level of knowledge when it came to the items on the preoperative checklist. The majority correctly identified important components such as patient identification, verification of the surgical site, and verification of consent. This indicates that they have a good grasp of the essential elements of the checklist.

Part III: Level of Knowledge on Intraoperative Checklist of SSC

The analysis also investigated participants' comprehension of the intraoperative checklist of the SSC. The responses to the items on the intraoperative checklist are presented in Table 3.

Table 3: The Level of Knowledge on the Intraoperative Checklist of SSC

Variables	Total score	Frequency (n)	Percentage (%)
Awareness of the OR nurse			
Good	20	66	73.3

Need to improve	4-19	24	26.7

According to the data, 66 respondents (73.3%) have a good understanding of the intraoperative checklist of the Surgical Safety Checklist (SSC), while 26.7% of the respondents need to improve their understanding. It is shown in Figure 2. Overall, the results show that participants have a strong understanding of the items on the intraoperative checklist, such as verifying essential equipment and communicating with the surgical team.

Table 2: The Level of Knowledge on the Perioperative Checklist of SSC

Variables	Total score	Frequency (n)	Percentage (%)
Knowledge of the OR nurse			
Good	20	70	77.8
Need to improve	4-19	20	22.2

Only 20 respondents (22.2%) needed improvement in their understanding of the

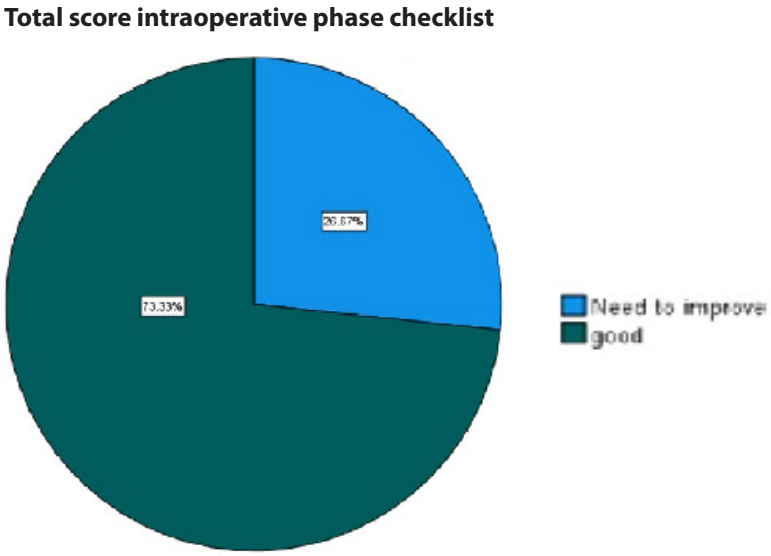

Figure 2: Level of knowledge on the intraoperative checklist of SSC among OR nurses

Part IV: Level of Knowledge on Postoperative Checklist of SSC

Lastly, the study assessed participants' understanding of the postoperative checklist for the Surgical Safety Checklist (SSC). Table 4 displays the distribution of responses to the individual items on the postoperative checklist.

Out of the 90 respondents, 70 (77.8%) of the OR nurses at Sultan Ahmad Shah Medical Center (SASMEC) demonstrated good knowledge of the postoperative checklist for the Surgical Safety Checklist (SSC).

postoperative checklist. Participants showed proficiency in items on the postoperative checklist, such as documenting procedures performed and communicating handover information. It is shown in Figure 3.

Overall, the findings suggest that operating room nurses at Sultan Ahmad Shah Medical Centre in Pahang, Malaysia, have a satisfactory level of knowledge about the components of the Surgical Safety Checklist. Specifically, 62% of OR nurses exhibited good knowledge of the preoperative checklist, 73.3% of the intraoperative checklist, and 70% of the postoperative checklist. However, a notable proportion of respondents need

improvement in their understanding across all phases, indicating the need for further education and training.

that adhere to the principles of simplicity, applicability, and measurement capacity to ensure comprehensive safety measures. The SSC should be utilised at critical points in the

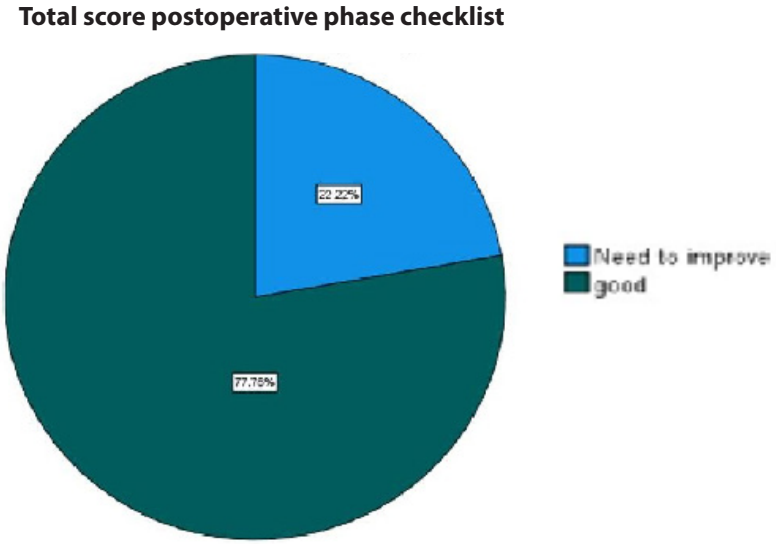

Figure 3: Level of knowledge on the postoperative checklist of SSC among OR nurses

DISCUSSION

Sociodemographic Characteristics of Participants

The sociodemographic characteristics of the participants revealed several notable trends. Firstly, the majority of respondents were over 30 years old, indicating an experienced workforce in the OR setting. This aligns with nursing, as age tends to correlate with experience. Additionally, the predominance of female respondents is consistent with the global nursing demographics, as women make up a significant majority of the nursing workforce. The sample was primarily Malay, reflecting the demographic makeup of Malaysia, where Malays are the largest ethnic group. Moreover, the high proportion of married participants suggests stability and commitment, which can positively influence their approach to patient care.

Level of Knowledge on Preoperative, Intraoperative, and Postoperative Checklists

The Surgical Safety Checklist (SSC) is a crucial tool for enhancing patient safety during surgery. It incorporates various components

surgical process, such as before the patient leaves the operating room before anaesthesia is administered, before the surgical incision, and at the end of the procedure (Bergs et al., 2014; Armstrong et al., 2022). By emphasising factors such as patient information, safety indicators, and early detection of adverse events, the SSC aims to ensure that the correct patient, surgery, and side are always considered. A systematic review by Treadwell et al. (2014) found that surgical checklists were associated with improved communication among operating staff, reduced surgical complications, and increased identification of potential safety hazards. To ensure the successful implementation of the checklist, strategies included involving institutional leaders as local champions, incorporating staff feedback for adaptation, and avoiding redundancy with existing information collection systems. Furthermore, Storesund et al. (2020) conducted a non-randomised clinical trial to evaluate the clinical effectiveness of the World Health Organisation's Checklists in Surgery and the Combined Surgical Patient Safety System. The results showed a decrease in the frequency of complications, reoperations,

and readmissions.

The evaluation process for OR nurses' knowledge level is meticulous and involves a specialised committee. This committee comprises experts in surgical nursing care, surgical nursing specialisation, patient safety, and surgery (Lim, et al., 2023). Working together, these professionals assess the proficiency and comprehension of OR nurses in various aspects of their discipline. The committee evaluates theoretical knowledge, adherence to safety protocols, and the ability to respond effectively in critical situations, as well as practical skills. By leveraging the diverse expertise of committee members, a comprehensive evaluation of OR nurses' knowledge base can be achieved, ensuring the delivery of high-quality care in surgical settings (Mamatkulov et al., 2022).

The study aimed to determine the level of knowledge that operating room (OR) nurses at Sultan Ahmad Shah Medical Centre (SASMEC) in Pahang, Malaysia, had regarding the Surgical Safety Checklist (SSC). The results indicate that the majority of OR nurses possessed sufficient knowledge about the SSC across all three stages: before surgery (68.9%), during surgery (73.3%), and after surgery (77.8%). This suggests that the implementation of the SSC at SASMEC has been successful and that OR nurses are well-informed about the essential measures required to ensure patient safety during surgical procedures. The nurses' strong understanding of safe surgical practices is particularly evident in their competence in key checklist items such as patient identification, surgical site verification, and communication with the surgical team.

In contrast, a study conducted by Sokhanvar et al. (2018) in Iran evaluated the attitude, awareness, and acceptability of the Surgical Safety Checklist (SSC) among operating room (OR) personnel. The study found that 92% of the participants were aware of the SSC, and 73.9% understood its objectives. Similarly, Delgado Hurtado et al. (2012) discovered that 93.8% of the 147 surgical personnel in Guatemala City were aware of the World Health Organisation (WHO) Surgical Safety Checklist, with 88.8% of them familiar with its objectives. Nevertheless, despite its widespread acceptance, there may be gaps in knowledge regarding the checklist's proper scheduling that could hinder its effective implementation.

The study's results indicate that a significant percentage of respondents (31.1% for preoperative, 26.7% for intraoperative, and 22.2% for postoperative) have a limited understanding of the Surgical Safety Checklist (SSC). To address these gaps, targeted educational interventions are necessary. It is recommended that individuals participate in refresher training programmes that are specifically tailored to each phase of the checklist. This approach will enhance comprehension and ensure consistent implementation throughout the surgical procedure. Swarjana et al. (2024) identified barriers to implementing the SSC, such as a lack of initiative, insufficient collaboration, and inadequate support from senior surgeons. They suggested that educational interventions effectively improve compliance with the SSC completion requirement. Additionally, Skarsgard (2016) emphasises the importance of consistently using the SSC in paediatric hospitals. According to the Paediatric Surgical Chiefs of Canada, this practice positively influences the safety culture in operating rooms. The study underscores the need for continuous monitoring and evaluation of OR nurses' knowledge regarding the SSC. Regular assessments can help identify emerging knowledge gaps and guide the development of tailored training programmes. Ultimately, this cyclical approach will foster a culture of patient safety in the OR by ensuring ongoing competence and adherence to the SSC.

This checklist is essential for ensuring that all necessary measures are taken to

protect the patient and prevent complications during surgery. Implementing surgical protocols has been proven to enhance communication among the surgical team, reduce complications, and identify potential safety hazards (Delisle et al., 2020). The focus is on improving clinical care and patient safety standards as protocols become more common in perioperative settings. The development and validation of a comprehensive surgical safety checklist aims to significantly decrease postoperative complications and streamline the verification process (Taplin et al., 2020). Additionally, operating room protocols like "time outs" provide an extra layer of assurance by allowing critical information to be re-verified before beginning surgical interventions (Birkmeyer, 2010; Poon et al., 2013). The implementation of these structured tools and protocols has enabled the OR nurses in SASMEC, Pahang, to deliver high-quality care and achieve optimal patient outcomes during the perioperative period.

Limitations

This study was limited by its cross-sectional design, which cannot establish causality. Additionally, the use of a convenience sample may not represent the entire population of OR nurses at SASMEC. Furthermore, the study's sample was limited to OR nurses at a single medical centre in Pahang, Malaysia, which may restrict the generalizability of findings to broader populations of OR nurses. Further research with a larger and more diverse sample population across various healthcare institutions is recommended to enhance the generalizability of the findings. Additionally, the study relied on self-reported data, which may be susceptible to response bias. Future research could incorporate objective measures of knowledge, such as direct observation of checklist use during surgical procedures, to provide a more comprehensive picture of OR nurses' adherence to the SSC.

Implications for practice and future research

The results of this study have important implications for both practice and future research in surgical settings. Firstly, the study highlights areas where nurses can enhance their knowledge and proficiency. This information can then be used to tailor targeted educational interventions aimed at improving nurses' understanding of the SSC components. Implementing continuing education programs, workshops, and simulation-based training sessions that specifically focus on checklist implementation and adherence could be highly beneficial in reinforcing best practices among nursing staff.

Additionally, the findings underscore the significance of organizational support and resource allocation to support ongoing training and professional development initiatives for nurses working in the operating room. Institutions should prioritize the provision of resources and infrastructure that foster high standards of patient safety and quality care delivery.

In terms of future research, it is important to explore the effectiveness of different educational interventions in enhancing nurses' adherence to SSC protocols, as well as their impact on patient outcomes. Conducting longitudinal studies that track changes in knowledge, attitudes, and practices following educational interventions would provide valuable insights into the sustainability and effectiveness of training programs.

CONCLUSION

Overall, this study offers valuable insights into the level of knowledge that OR nurses at SASMEC have regarding the SSC. While most nurses demonstrate a good understanding of the checklist, there is still room for improvement for a significant portion. To address this, we propose implementing targeted educational interventions and maintaining ongoing monitoring. This will ensure that all OR nurses possess the necessary

knowledge to successfully implement the SSC, ultimately enhancing patient safety during surgical procedures.

CONFLICT OF INTEREST

The authors have not declared any conflict of interest.

ACKNOWLEDGEMENTS

We would like to sincerely thank the operating room (OR) nurses from Hospital Universiti Sains Malaysia (HUSM) and Sultan Ahmad Shah Medical Center (SASMEC@IIUM) for their participation in this study.

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