Adherence to the completion of the safe surgery checklist in ophthalmic surgeries

Adesão ao preenchimento do checklist *de cirurgias seguras oftalmológicas*

Adhesión al llenado del checklist *de cirugías seguras oftalmológicas*

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ABSTRACT: Objective: To identify adherence to completing the safe surgery checklist at an ophthalmic surgical center. **Method:** A descriptive, observational study was conducted at the ophthalmic surgical center of a teaching hospital, involving data collection from 162 ophthalmic surgeries. Data were gathered using an instrument adapted from the World Health Organization's (WHO) safe surgery checklist and subjected to statistical analysis using R software. **Results:** High adherence was observed in items related to patient identification (100%/162), followed by the presence of a pulse oximeter on the patient (98.10%/159) and surgical site marking (94.40%/153). Conversely, the items with the lowest adherence were material count (10.50%/17), team member introductions (11.10%/18), and anesthetic safety verification (30.90%/50). **Conclusion:** Although the checklist was widely used in all observed surgical procedures, compliance with completing the items varied, particularly in the third phase, indicating barriers to adherence. The lack of full completion suggests difficulties in adopting safe practices and highlights the need for ongoing training and changes in organizational culture.

Keywords: Checklist. Patient safety. Perioperative nursing. Ophthalmologic surgical procedures.

RESUMO: Objetivo: Identificar a adesão ao preenchimento da lista de verificação de cirurgia segura de um centro cirúrgico oftalmológico. **Método:** Estudo descritivo, observacional, realizado em um centro cirúrgico oftalmológico de um hospital de ensino, que envolveu a coleta de dados em 162 cirurgias oftalmológicas. Os dados foram coletados por meio de um instrumento adaptado do *checklist* de cirurgia segura da Organização Mundial da Saúde (OMS) e submetidos à análise estatística utilizando o *software* R. **Resultados:** Verificou-se alta adesão nos itens relacionados à identificação do paciente (100%/162), seguida da presença do oxímetro de pulso no paciente (98,10%/159) e da demarcação do sítio cirúrgico (94,40%/153). Por outro lado, os itens com menor adesão foram a contagem de material (10,50%/17), a apresentação dos membros da equipe (11,10%/18) e a verificação da segurança anestésica (30,90%/50). **Conclusão:** Embora o *checklist* tenha sido amplamente utilizado em todas as intervenções cirúrgicas observadas, a conformidade no preenchimento dos itens variou, especialmente no terceiro momento, indicando barreiras na adesão. A falta de preenchimento completo sugere dificuldades na adoção de práticas seguras e aponta para a necessidade de treinamentos contínuos e mudanças na cultura organizacional.

Palavras-chave: Lista de checagem. Segurança do paciente. Enfermagem perioperatória. Procedimentos cirúrgicos oftalmológicos.

RESUMEN: Objetivo: Identificar la adhesión al llenado del *checklist* de cirugía segura en un centro quirúrgico oftalmológico. **Método:** Estudio descriptivo, observacional, realizado en un centro quirúrgico oftalmológico de un hospital universitario, que involucró la recolección de datos de 162 cirugías oftalmológicas. Los datos fueron recolectados mediante un instrumento adaptado del *checklist* de cirugía segura de la Organización Mundial de la Salud (OMS) y analizados estadísticamente utilizando el software R. **Resultados:** Se observó una alta adhesión en los ítems relacionados con la identificación del paciente (100%/162), seguido de la presencia de un oxímetro de pulso en el paciente (98,10%/159) y la marcación del sitio quirúrgico (94,40%/153). Sin embargo, los ítems con menor adhesión fueron la cuenta del material (10,50%/17), la presentación de los miembros del

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equipo (11,10%/18) y la verificación de la seguridad anestésica (30,90%/50). **Conclusión:** Aunque el *checklist* fue utilizado en todas las intervenciones quirúrgicas observadas, la conformidad en el llenado de los ítems varió, especialmente en la tercera fase, lo que indica barreras en la adhesión. La falta de cumplimiento completo sugiere dificultades en la adopción de prácticas seguras y señala la necesidad de entrenamientos continuos y cambios en la cultura organizacional.

Palabras clave: Lista de verificación. Seguridad del paciente. Enfermería perioperatoria. Procedimientos quirúrgicos oftalmológicos.

INTRODUCTION

In 2004, the World Health Organization (WHO) established the Global Alliance for Patient Safety to enhance surgical patient safety and reduce adverse events and harm. Subsequently, in 2008, the Safe Surgery Saves Lives program was introduced to further minimize adverse events and standardize safety measures in surgical care[1]. The implementation of this program includes the adoption of various actions and tools aimed at reducing adverse events, such as the safe surgery checklist. This checklist encompasses three stages: first, before anesthetic induction (sign in); second, before surgical incision (timeout); and third, before the patient leaves the operating room (sign out)[2].

The application of this tool is intended to support the surgical team during patient care in the intraoperative period and to enhance communication among team members. The checklist is designed to be easily understood and used by any member of the surgical team. Consequently, adherence to the checklist ensures that all items are reviewed, thereby promoting surgical safety[1].

Ophthalmologic surgical procedures are now among the most commonly performed in hospitals and outpatient clinics. These interventions are associated with a high rate of documented complications, with the majority related to incorrect intraocular lens implantation (63.2%), incorrect ocular surgery (14.2%), incorrect ocular block (13.2%), errors involving the patient or the procedure (7.55%), and incorrect transplantation (1.89%)[3].

In a study of 18,081 ophthalmological procedures, nearly adverse events were documented in 53 cases (0.29%), primarily related to incorrect side and lens implants, affecting 52 patients (0.59% of cataract surgeries)[4].

This research underscores the scarcity of studies on adherence to and use of the checklist, especially within the context of ophthalmic surgical practice. It highlights the need for further investigation, as the checklist is an essential tool for evaluating the quality of care provided and implementing measures aimed at patient safety.

Analyzing healthcare professionals' adherence to the Safe Surgery Saves Lives checklist is crucial for understanding its application in surgical care. It is also important to examine factors that influence adherence and identify any weaknesses in the process. This allows for corrections to ensure that the checklist effectively enhances surgical patient safety.

OBJECTIVE

To assess adherence to completing the Safe Surgery checklist at an ophthalmic surgical center.

METHOD

This cross-sectional, observational study was conducted at the ophthalmic surgical center of the University Hospital of Universidade Federal do Maranhão (HU-UFMA) in São Luís, Maranhão, Brazil. The center performs interventions across various subspecialties, including strabismus correction, corneal transplantation, and antiglaucoma surgery. Data for the research were collected throughout March 2021, as scheduled in the research project, during both morning and afternoon shifts by the responsible researchers.

To calculate the sample, the following formula was used[5]:

$$n=[N.\ Z^2.\ p.\ (1-p)]\ /\ [(N-1).\ e^2+Z^2.\ p.\ (1-p)]$$

Where:
n: sample size to be calculated;
N: population size;
Z: confidence level;
e: sampling error;
p: population distribution.

Based on a population average of 230 patients per month (N=230) and considering a 95% confidence interval with a 5% margin of error, a sample size of 145 surgeries was determined for this study. However, during the data collection

period, information was obtained for 162 surgeries (n=162) of patients treated at the Ophthalmology Reference Center of HU-UFMA.

The study included adult and pediatric patients of both genders, without age restrictions, who underwent surgeries at the ophthalmological surgical center where the Safe Surgery protocol was applied.

Since the checklist is an established safety practice in the institution's surgical centers, there were no exclusion criteria for this research.

The study employed non-probabilistic random observation of surgeries. The surgical team members (nurses, nursing technicians, surgeons, and anesthetists) were authorized to observe the Safe Surgery checklist after reading and signing the Informed Consent. The Informed Consent was also provided to patients to inform them about the research and request permission to collect their data.

The instrument used is an adaptation of the WHO standard checklist developed by the researchers. Following its development, the researchers were trained in data collection. The instrument was employed to verify whether the checklist items were completed by the team at the appropriate times.

Possible responses included "yes," "no," and "not applicable." Marking "yes" indicated that the item was performed at the appropriate time and in accordance with WHO guidelines by the team. Marking "no" indicated that the item was either not performed or was performed outside the specified time. "Not applicable" was used when the item was not relevant to that particular surgery or when verification was not possible, as outlined by the protocol.

This instrument was applied within the surgical rooms during patient care throughout the intraoperative period, from the patient's entry into the room until their exit. The application was divided into three distinct moments (Chart 1).

Descriptive data were analyzed using Microsoft Office Excel (version 1.0, 2016, Microsoft 365, United States) and R statistical software (version 2023.03.1+446, 2019, R Foundation for Statistical Computing, Austria).

The study was submitted to the Research Ethics Committee of the University Hospital of Universidade Federal do Maranhão (HU-UFMA) and received approval, with CAAE registration number 36400720.2.0000.5086 and opinion number 4.357.652.

RESULTS

The data obtained from the application of the Safe Surgery checklist in the ophthalmic surgical center were divided into four moments, based on the WHO Safe Surgery checklist, which was adapted for use in the institution's ophthalmic surgeries. Table 1 presents the distribution of the sample according to variables related to the completion of items during the first moment.

Chart 1. Steps designated to apply the safe surgery checklist save lives.

1st step: Before anesthesia induction	Patient identification
	Surgical site marking
	Verification of anesthetic safety
	Presence and functioning of the pulse oximeter on the patient
	Identification of allergies
	Assessment of difficult airway/aspiration risk
	Risk of blood loss greater than 500 mL
2nd step: Before surgical incision	Presentation of all team members by name and function, with verbal confirmation by the surgeon, anesthesiologist, and nursing staff, and identification of the patient, surgical site, and procedure to be performed
	Verification of critical events anticipated by the surgeon, anesthesiologist, and nursing team
	Administration of antimicrobial prophylaxis within the last 60 minutes
	Availability of essential imaging
3rd step: Before the patient leaves the operating room	Complete intraoperative procedure record
	Count of instruments, sponges, and needles
	Identification of the sample for pathological analysis
	Resolution of any equipment issues

Table 1. Filling in the items related to the first moment: Before anesthesia induction (identification). São Luís (MA), Brazil, 2021.

Characteristics	Categories	n=162	%
1. Patient confirmed			
a. Identity	Yes	162	100.00
b. Surgical site	Yes	162	100.00
c. Procedure	Yes	162	100.00
d. Consent	Yes	162	100.00
2. The surgical site was marked	Yes	153	94.40
	No	9	5.60
3. Anesthetic safety verification completed	Yes	50	30.90
	No	112	69.10
4. Pulse oximeter on the patient and functioning	Yes	159	98.10
	No	3	1.90
5. The patient has:			
a. Known allergy	Yes	11	6.80
	No	151	93.20
b. Difficult airway/ aspiration risk	Yes	11	6.80
	No	151	93.20
c. Risk of blood loss >500 mL	Yes	11	6.80
	No	151	93.20
6. Was antimicrobial prophylaxis performed?	Yes	151	93.20
	Not applicable	11	6.80
7. Are the essential images available?	Yes	156	96.30
	No	6	3.70

Source: prepared by the authors.

Table 2. Completion of items for the second moment: before the surgical incision (confirmation). São Luís (MA), Brazil, 2021.

Characteristics	Categories	n=162	%
1. All team members introduced themselves by name and role	Yes	18	11.10
	No	144	89.00
2. The surgeon, anesthesiologist, and nursing team confirmed			
a. Patient identification	Yes	153	94.40
	No	9	5.60
b. Surgical site	Yes	154	95.10
	No	8	4.90
c. Procedure	Yes	155	95.70
	No	7	4.30
3. Critical events were reviewed			
a. By the surgeon	Yes	6	3.70
	No	154	95.10
	Not applicable	2	1.20
b. By the anesthesiology team	Yes	2	1.20
	No	158	97.60
	Not applicable	2	1.20
c. By the nursing team	Yes	151	93.20
	No	9	5.60
	Not applicable	2	1.20

Source: prepared by the authors.

During the study period, it was observed that the checklist was applied to all ophthalmological surgeries, achieving a 100% implementation rate. All items related to patient confirmation were fully adhered to, representing 100% compliance in the surgeries (162). The surgical site was demarcated in 94.40% of the procedures (153). However, only 30.90% of the procedures (50) underwent anesthetic safety verification. Lastly, the presence of a pulse oximeter on the patient was confirmed in 98.10% of the interventions (159).

The data for the second stage of the Safe Surgery checklist are presented in Table 2. This stage showed a lower adherence rate in the component regarding the presentation of all team members by name and function, which was confirmed in only 11.10% of surgeries (18).

Confirmation of patient identification by the team, including the surgeon, anesthesiologist, and nursing staff, was performed in 94.40% of surgeries (153). Additionally, confirmation of the surgical site and procedure was observed in 95.10% (154) and 95.70% (155) of interventions, respectively. Notably, among the surgical team members, nursing professionals conducted more reviews of critical events predicted in surgeries, covering 93.20% of procedures (151).

Data related to the third stage are detailed in Table 3. Verbal confirmation by the nursing or medical team with the surgical team regarding the complete record of the intraoperative procedure was performed in 82.10% of surgeries (133). Verification of the count of instruments, compresses, and needles was not verbally confirmed in 89.50% of cases (145). Conversely, essential concerns for recovery and patient management by the team were reviewed in 100% of cases (162).

DISCUSSION

Using the checklist facilitates the verification of critical aspects of patient safety, including correct identification, confirmation

Table 3. Completion of items for the third moment: before the patient leaves the operating room (record). São Luís (MA), Brazil, 2021.

Characteristics	Categories	n=162	%
1. A member of the nursing or medical team verbally confirmed with the team			
a. Complete intraoperative procedure documentation	Yes	133	82.10
	No	29	17.90
b. Instrument, sponge, and needle count	Yes	17	10.50
	No	145	89.50
c. Identification of samples for pathological analysis	Yes	37	22.80
	Not applicable	125	77.20
d. Any equipment issues to be resolved	No	162	100
2. The team reviewed essential concerns for patient recovery and management	Yes	162	100

Source: prepared by the authors.

of allergies, and marking the surgical site before administering anesthesia.

The Safe Surgery Protocol was implemented at the hospital institution in 2014 as part of the restructuring of its surgical centers, with the goal of enhancing the quality of services provided to patients of the Brazilian Unified Health System (*Sistema Único de Saúde* – SUS). Conducting this study seven years after the implementation and review of the checklist allowed for the collection of data on health professionals' adherence to the WHO-developed protocol. This study contributed to a deeper understanding of a topic that is still underexplored in the scientific literature but is crucial for strengthening the safety of patients undergoing ophthalmological surgeries.

The research revealed that, although documentation of compliance with the surgical safety checklist was observed in all cases, variation in adherence was identified across different verification stages. Notably, at the first stage, only aspects related to patient identification and confirmation of allergies achieved 100% compliance (162), indicating that health professionals recognize the importance of confirming and completing this information before initiating any phase of the perioperative process[6].

The surgical site demarcation was recorded in 94.4% of cases (153), indicating effective performance by the nursing team in confirming this item with the surgical team. Demarcation of laterality is a practice widely adopted in surgeries and other invasive procedures worldwide. Performed by the physician on the surgical team, it underscores the importance of patient participation in confirming the site of the intervention[7]. This practice is essential before transferring the patient to the surgical center to prevent errors.

Notably, the items most frequently marked are those directly linked to the risk of death, such as "allergies," "compromised airway," and "risk of hemorrhage." Items perceived as critical or of higher risk tend to receive more attention and adherence from the professionals responsible for their verification[8].

Anesthetic safety verification was conducted in only 30.90% of surgeries (50). A study evaluating the association between the use of the surgical safety checklist and adverse anesthesia-related events in public and private health units in Ethiopia, from December 2020 to May 2021, found that 71.5% of surgeries did not present anesthetic complications due to the verification of anesthetic safety through the checklist[9]. This assessment is crucial for detecting factors that could lead to serious events, potentially resulting in permanent disabilities or death. Furthermore, an adequate verification process is essential for accurate planning, which, in turn, helps to reduce complications[10].

Regarding the second stage, it was noted that the component with the lowest compliance rate was the presentation of all team members by name and function, which did not occur in 89% of surgeries (144). This level of adherence was lower compared to a Brazilian study analyzing orthopedic surgery checklists, where the team introduced itself before the surgical incision, reviewed the surgical plan, and discussed possible complications in 48.2% of procedures[11]. Similarly, a Swedish study revealed that 58% of procedures involved the team introducing themselves by name and function[12].

The presentation of the surgical team enhances interaction among professionals, leading to a better understanding of individual responsibilities and quicker responses to unexpected situations[13].

The items for confirming patient identification with the surgeon were verified in 94.40% of surgeries (153); the surgical site in 95.10% (154); and the procedure in 95.70% (155). These results indicate higher adherence to these safety checklist items compared to a study conducted in Sweden, where only 25% of surgeries had confirmation of the surgical site by the team, and patient identity was confirmed in 83% of interventions. It is noteworthy that surgical specialties involving double laterality, such as ophthalmology, present a higher potential for errors[14].

The predicted critical events, as highlighted in this study, were most frequently identified by the nursing team. This finding aligns with expectations, given that nurses typically lead the completion of the checklist, even though any member of the surgical team can fulfill this role. The nurse's predominant presence in the operating room, along with the extended time spent caring for the surgical patient, enables them to more readily identify potential complications[15].

The step in the second stage of the checklist that recorded the highest compliance was the administration of antimicrobial prophylaxis — 93.20% of cases (151). The remaining 6.80% (11) involved surgeries, such as pterygium procedures, where antibiotic prophylaxis was not required.

The present study showed higher compliance with the administration of antimicrobial prophylaxis compared to a Brazilian study, which reported a compliance rate of 85.2% for this item[11]. Adherence to antibiotic prophylaxis is crucial, as it must follow established institutional protocols aimed at preventing infections and ensuring patient safety[16].

Regarding the third moment, the study found that verbal confirmation by the nursing and medical teams with the surgical team regarding the complete recording of the intraoperative procedure occurred in 82.10% of surgical procedures (133). This verbal confirmation of key elements helps prevent errors and reflects the team's commitment to ensuring the surgery proceeded without significant incidents or that relevant risks were adequately addressed[17].

The verbal confirmation of the count of instruments, compresses, and needles was not performed in 89.50% of surgeries (145), aligning with findings from Brazilian studies where the verification of this item varied between 39.5 and 77.4%. This low adherence reflects a significant gap in professionals' compliance with this critical safety check[11,18]. The counting of instruments is vital in preventing the accidental retention of surgical materials, which can lead to severe patient complications, including extended hospital stays, additional high-risk surgeries, increased healthcare costs, and, in extreme cases, death. This procedure is essential in all surgeries, as retained items can occur even in non-cavity procedures.

The counting of instruments plays a crucial role in preventing the accidental retention of materials, which can have serious consequences for the patient, such as prolonged hospital stays, additional high-risk surgical procedures, significant hospital costs, and, in extreme cases, death. This procedure should be performed in every surgery, as the retention of surgical items can occur not only in surgeries involving large cavities[19].

The analysis of the completion of the checklist in the three moments of the study showed that the first moment had fewer inconsistencies compared to the other two. Similarly, a study conducted in a state hospital and a university hospital in Turkey found that the first moment was the most completed (69.5%) compared to the others in the safe surgery checklist. This suggests that items in the first moment tend to be more frequently completed than those in the subsequent stages of the checklist[20,21].

Contributions to perioperative nursing

The study's potential lies in its originality, given the scarcity of national and international data on adherence to the safe surgery protocol in ophthalmological procedures. The results have the potential to guide the development of institutional measures aimed at improving the documentation of checklist item verification, thereby promoting a professional practice more centered on patient safety.

Study limitations

The limitations of this research may be attributed to the study population, consisting exclusively of professionals from a federal public institution within SUS. Moreover, data collection was limited to a single month, which could restrict the generalizability of the findings. Additionally, it is important to emphasize the need for studies focusing on the implementation of this checklist in private healthcare institutions.

CONCLUSION

The checklist was utilized in all the observed surgical interventions. Although the WHO manual permits any member of the surgical team to apply the checklist, in the institution where this study was conducted, it was observed that the checklist was exclusively completed by the nursing team, consisting of nurses and nursing technicians, in 100% of the surgeries (162) monitored.

The adherence rate for completing the verification items varied across the different stages of the checklist, with the highest rate recorded in the first stage and the lowest in the third stage. The lower adherence rate observed in the third stage, where not all items were checked, highlights the need to identify and address the barriers contributing to this reduced compliance and promote changes in the organizational culture.

The incomplete records indicate challenges in fully adopting safe practices by the surgical team. This underscores the necessity of continuous training and dedicated efforts from the surgical center's management team. Improving compliance with the protocol is closely tied to the surgical team's recognition of the checklist as an effective tool for promoting safety in daily surgical routines. Greater adherence will lead to improvements not only in patient safety but also in the overall effectiveness of teamwork.

The need for further studies is emphasized, encompassing a range of institutional profiles and healthcare professionals. This is essential to better understand the disparities in adherence to the safe surgery protocol in ophthalmological procedures and to identify the factors contributing to difficulties in achieving full adherence.

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CONFLICT OF INTERESTS

The authors declare there is no conflict of interests.

AUTHORS' CONTRIBUTIONS

ASF: Conceptualization, Data curation, Investigation, Writing – original draft, Writing – review & editing, Software. PPCR: Project administration, Formal analysis, Writing – review & editing, Supervision, Validation. DJLCS: Formal analysis, Writing – review & editing. ADJ: Formal analysis, Methodology, Writing – review & editing, Supervision. ILTPR: Writing – review & editing, Visualization, Supervision. NAVM: Writing – review & editing, Visualization.

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