SAFE SURGERY COMPLIANCE CHECKLIST: ANALYSIS OF PEDIATRIC SURGERIES

Adesão ao checklist de cirurgia segura: análise das cirurgias pediátricas

Adhesión al checklist de cirugía segura: análisis de las cirugías pediátricas

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ABSTRACT: Objective: This study analyzed the safe surgical checklist compliance in surgeries performed in children and adolescents up to 17 years old, as well as the factors that influence its use. **Method:** Cross-sectional, analytical study performed in a public hospital. The medical charts of surgeries performed on children and adolescents up to the age of 17 were analyzed in the year 2017. Descriptive statistical analysis, Fisher's exact test and logistic regression were applied. **Results:** The sample consisted of 262 medical records of children and adolescents, 65.68% belonged to males, adenoidectomy and tonsillectomy procedures were prevalent. It was observed that 12.9% checklists were fully completed, 86.4% partially completed and 0.7% were not completed. There was no significant association between compliance to the instrument and the factors analyzed. **Conclusion:** Complete adherence to the checklist was 12.9%, with differences in completion between stages, and there was no single factor responsible for the inadequacy. The partial completion in most cases indicates the need to deconstruct the barriers related to performing the checklist, by employing educational actions involving the teams and understanding the application of the instrument, which may benefit surgical safety and quality of care.

Keywords: Checklist. Patient safety. Perioperative nursing.

RESUMO: Objetivo: Este estudo analisou a adesão ao preenchimento do *checklist* de cirurgia segura em procedimentos realizados em crianças e adolescentes de até 17 anos, bem como os fatores que influenciam a sua utilização. **Método:** Estudo analítico, transversal, realizado em um hospital público. Foram analisados os prontuários de cirurgias executadas em crianças e adolescentes de até 17 anos, no ano de 2017. Foi aplicada análise estatística descritiva, teste Exato de Fisher e regressão logística. **Resultados:** A amostra foi composta por 262 prontuários de crianças e adolescentes, 65,68% do sexo masculino, prevalecendo os procedimentos de adenoidectomia e amigdalectomia. Observou-se em 12,9% dos *checklists* o preenchimento completo, em 86,4%, parcial e em 0,7% a lista não foi preenchida. Não houve associação significativa entre a adesão ao instrumento e os fatores analisados. **Conclusão:** A adesão completa ao *checklist* foi de 12,9% com diferença no preenchimento entre as etapas, e não houve um único fator responsável pela inadequação. O preenchimento parcial na maioria dos casos sinaliza a necessidade de desconstruir as barreiras para conduzir o *checklist*, com ações educativas envolvendo as equipes e o real entendimento da aplicação do instrumento, que pode favorecer a segurança cirúrgica e a qualidade da assistência.

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

RESUMEN: Objetivo: Este estudio analizó la adhesión al llenado del *checklist* de cirugía segura en cirugías realizadas en niños y adolescentes de hasta 17 años, así como los factores que influyen su utilización. **Método:** Estudio analítico, transversal, realizado en un hospital público. Fueron analizados los prontuarios de cirugías ejecutadas en niños y adolescentes de hasta 17 años, el año de 2017. Fue aplicado análisis estadístico descriptivo, test Exacto de Fisher y regresión logística. **Resultados:** La muestra fue compuesta por 262 históricos médicos de niños y adolescentes, un 65,68% del sexo masculino,

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prevaleciendo los procedimientos de adenoidectomía e amigdalectomía. Se observó en un 12,9% de los *checklists* el llenado completo, en un 86,4%, parcial y en un 0,7% la lista no fue llenada. No hubo asociación significativa entre la adhesión al instrumento y los factores analizados. **Conclusión:** La adhesión completa al *checklist* fue del 12,9% con diferencia en el llenado entre las etapas, y no hubo un único factor responsable por la inadecuación. El llenado parcial en la mayoría de los casos señala la necesidad de deconstruir las barreras para conducir el *checklist*, con acciones educativas involucrando los equipos y el real entendimiento de la aplicación del instrumento, que puede favorecer la seguridad quirúrgica y la calidad de la asistencia.

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

INTRODUCTION

With technological advances and improved health care, surgical care has become an intervention with considerable possibilities,accessability and high complexity, but it is liable to error[1,2]. Surgical procedures have expanded, and approximately 234 million surgeries are performed each year, on average one for every 25 people, which has a great impact on public health[3].

Among these surgical interventions, it is estimated that seven million patients suffer significant complications each year and at least one million die during or after the procedure[3]. According to the World Health Organization (WHO), every year tens of millions of patients suffer disabling injuries or death due to inadequate health care, and half of the post-operative complications are considered preventable worldwide[3]. Despite advances in surgical care, adverse events in the perioperative period reach up to 3%, and more than half are considered preventable[3].

Inadequate infrastructure, poor quality of resources, lack of skills and scarce human and material resources are the primary reasons that lead to adverse surgical events[1,4]. Other factors, such as the non-identification of the patient, lack of recognition of complications, lack of verification of materials, poor communication among staff, as well as distractions, inappropriate post-operative behaviors, incorrect procedures and sites and / or patients that could be avoided[5,6].

In view of the above context and to enhance patient safety, WHO developed the Global Patient Safety Alliance in 2004. Launched in 2008, the second Global Challenge, called Safe Surgeries Save Lives, developed the Surgical Safety Checklist. This list, called The Safe Surgery Checklist, was drawn up based on the ten essential goals for a safe procedure. The aims are to improve safety in surgical interventions and reduce risks, adverse events, complications and avoidable deaths during the procedure and in the postoperative period[3].

The implementation of this worldwide surgical safety standard is accessible because it is secure, low cost, only takes 3 minutes, does not cause damages to the patient and can be adapted according to the different surgical scenarios[1,3]. A single professional, named the coordinator, is responsible for the checklist, however cooperation between the surgical team and the patient is essential[3]. It is recommended that the instrument is coordinated by any professional who knows the procedure, but that the nurse should guide its execution[3].

Researchers[7-11] prove that the use of the checklist promotes progress in communication between teams and reduces errors, complications and deaths due to surgical procedures, benefits the patient, the team and the health unit. An international survey[10] conducted in eight hospitals in eight countries with different economic contexts resulted in a 36% reduction in complications and a 47% reduction in deaths after the instrument was introduced, in addition to an increase in the use of antibiotics from 56% to 83% which resulted in reduction of surgical site infections (SSI).

In a recent study[11] developed in a large general hospital in Rio Grande do Sul, the authors reported a reduction in SSI rates, from 4.2 to 1.1%, and a 75% risk reduction identified after using the checklist. In another study[9] with 147 nurses from all regions of Brazil, 76.9% of professionals declared that they used the instrument in the institution and 83.2% reported improvement in care. Those who do not apply the instrument stated that when they were working they would like it to be employed. A change in interprofessional communication was reported by 78.8% of nurses.

Therefore, it is asked: What is the safe surgery checklist compliance in procedures performed on children and adolescents up to 17 years, after ten years of the development of the Checklist?

OBJECTIVE

To analyze compliance regarding the completion of the safe surgery checklistin procedures performed on children and adolescents up to the age of 17 years, as well as the factors that influence their use.

METHOD

This is a cross-sectional analytical study on the compliance to the completion of the safe surgery checklist by professionals of the Surgical Center (SC) of a public hospital of small and medium complexity, in São Paulo.

The hospital has four operating rooms, which specialize in general surgery, pediatric surgery, vascular surgery, urology,gynecology, ophthalmology, otorhinolaryngology, orthopedics, mastology, dermatology and plastic surgery. An average of 200 anesthetic-surgical procedures per are performed per month.

The checklists related to surgeries performed in patients up to 17 years, 11 months and 29 days in the SC, from January to December 2017 were considered as a criterion for inclusion in this study. Surgery data were verified between April and June of 2018, in the electronic medical records, through an instrument developed by the researchers specifically for the present study.

The dependent variables, or indicators related to the checklist compliance, consist of: existence of a checklist in the medical record (yes or no); checklist completion (complete, partial or uncompleted); completion of each phase: before the anesthetic induction (phase I - items 1 to 7), before the surgical incision (phase II - items 8 to 14) and before leaving the operating room (phase III - items 15 to 19); completing each of the items; and percentage of completed items.

Phase I (identification or sign in) corresponds to the period before anesthetic induction:

1. data identification and patient consent;
2. marked surgical site;
3. anesthesia safety check;
4. pulse oximeter;
5. allergies;
6. difficult airway;
7. risk of blood loss.

Phase II (confirmation or timeout) refers to the period after anesthetic induction and before the surgical incision:

8. presentation of team members;
9. Team confirms patient data;
10. expected duration;
11. anesthesiologist review;
12. nursing team review;
13. antimicrobial prophylaxis;
14. available imaging exams.

Phase III (record or sing out) related to the period during or immediately after wound closure and before the patient leaves the operating room:

15. registration confirmation and instrument count;
16. swab count;
17. identification of samples;
18. problems with equipment;
19. review of recovery concerns.

It should be noted that the checklist is inserted in the patients electronic medical record, and there were changed made to the instrument proposed by WHO. The evaluated independent variables , potentially associated with adherence, were: characterization data, with patient's age (years) and sex (female or male); surgical data, including month (January to December); shift (morning or afternoon); (general surgery, vascular surgery, pediatric surgery, urology, gynecology, ophthalmology, otorhinolaryngology, mastology, dermatology and plastic surgery); surgery performed; duration of surgery (minutes); type of anesthesia (general, regional, sedation and / or local) and professional responsible for the checklist.

A non-probabilistic intentional sample was used, including all surgeries performed in children and adolescents in 2017. Data were entered in a spreadsheet in Microsoft Excel and later analyzed by the Statistical Package for Social Sciences), version 15.0, and Rv.2.11.0. Descriptive statistics were performed with frequency, mean and median in order to characterize the surgeries. The association between checklist compliance by medical specialty was analyzed by Fisher's exact test. Boxplots were used in order to verify if the duration of the surgery interferes in the completion of the instrument. All effects and relationships associated with values of $p < 0.05$ were considered significant.

This research was approved by the Research Ethics Committee of the chosen institution, under Opinion 2,499,116 and Registration 81985417.8.0000.5411, and complied with the ethical requirements for research. Informed Consent Forms were not used as retrospective secondary data were used.

RESULTS

During the study period, 271 surgeries were identified, however, the absence of the checklist in medical charts represented 2.58% of the surgeries and the non-completion represented 0.7%. Thus, the study sample consisted of 262 medical records belonging to children and adolescents.

According to the data in Table 1, 64.9% of the patients are males, with an average age of 8 years. The month with the highest number of performed procedures was May (14.9%), with predominance in the morning (63.7%). There was a significant decrease in surgeries in the service in January, November and December, a fact that was already antecipated. During this period, only procedures with local anesthesia occurred, and the more complex surgeries were sent to the tertiary hospital.

The anesthesia presented n = 325, since more than one type of anesthetic procedure was performed in one patient, and the most used was general anesthesia (53.9%). There was a predominance of the otorhinolaryngology medical specialty (35.5%), followed by orthopeadics (24.0%) and pediatric surgery (16.4%). A total of 354 procedures were performed, because the same patient had undergone different procedures in the same surgical procedure. The main procedures performed were adenoidectomy and tonsillectomy (24.3%), followed by postectomy (8.5%), with each surgery taking na average of 45 minutes.

In 99.6% of the evaluated forms, the nursing technician was the responsible professional and in 0,4% of the evaluated forms it was the nurse From the completion of the Checklist, it was observed in 34 cases (12.9%), that the items were fully completed; in 228 (86.4%) were partially completed; and two (0.7%) were not completed. Regarding the phases of the checklist, the evaluation of the compliance to the checklist occurred in 262 instruments, since those that were not completed were excluded.

It was verified that phase I had 90.4% completion, phase II 92.5% and phase III 17.1%.

Considering the 19 items in the checklist, the one that presented the lowest adherence in regards to filling in was "Revision of the concerns regarding recovery", of phase III, with 77.1% inadequacy, followed by "Review of the nursing team", phase II, and "Data identification and patient consent" from phaseI, with 2.8% inadequacies (Table 2)

There was no association between the compliance to the checklist and the main surgical specialties (otorhinolaryngology, orthopedics, pediatric surgery, ophthalmology urology and others) in phases I (p = 0.248), II (p = 0.895) and III (p = 0.627) of the Checklist (Table 3).

Regardless of the time of the checklist or considering the completion process as a whole, it was found that the duration of the surgery did not interfere with the complete, partial or non-completion of the list (Figure 1).

Table 1. Distribution of surgeries according to gender, patient age, month, shift, anesthesia, specialty, procedure and duration.

Variables	Number	Percentage (%)
Sex		
Female	92	35,1
Male	170	64,9
Age(years)*	8; 7 (1–17)	
Month		
January	0	0
February	15	5,7
March	37	14,1
April	33	12,6
May	39	14,9
June	26	9,9
July	23	8,8
August	29	11,0
September	23	8,8
October	27	10,3
November	08	3,1
December	02	0,8
Shift		
Morning	167	63,7
Afternoon	95	36,3
Type of anesthesia (n=325)		
General	175	53,9
Sedation	82	25,2
Regional	50	15,4
Local	15	4,6
Not informed	03	0,9
Surgical speciality		
Otorhinolaryngology	93	35,5
Orthopedics / traumatology	63	24,1
Pediatric surgery	43	16,4
Ophthalmology	31	11,8
Urology	23	8,8
Other	09	3,4
Surgical procedure (n=354)		
Adenoidectomy	86	24,3
Tonsillectomy	86	24,3
Postectomy	30	8,5
Umbilical Hernioplasty	18	5,1
Other	134	37,8
Surgery time (minutes)*	45; 49 (5–170)	

*Average; median (minimum – maximum).

DISCUSSION

The sample was composed of 262 analyzed charts.The surgical profile presented a prevalence of male patients (64.9%), similar to other studies[5,12], which indicated 70% and 55% of surgeries performed on men. Regarding age prevalence, no studies were found which only used the checklist in procedures performed on children and adolescents, but an analysis[12] performed at the University Hospital of Londrina (PR) resulted in 20% of patients being 20 years of age or younger.

The purpose of the Safe Surgery Checklist is to improve the quality of surgical care and to certify the safety of anesthetic-surgical procedures through a standard that can be applied worldwide[3].

Table 2. Inadequate completion of checklist items, according to each phase of the Checklist.

Item	Number	Percentage (%)
Phase I	27	9,6
Identification of details and patient consent	8	2,8
Surgical site marked	1	0,3
Anesthetic safety check	3	1,0
Pulse oximeter	2	0,8
Allergies	6	2,1
Difficult airway	3	1,0
Risk of blood loss	4	1,4
Phase II	21	7,5
Presentation of team members	2	0,8
Patient confirmed by team members	-	-
Expected duration	2	0,8
Anesthesiologist review	2	0,8
Nursing team review	8	2,8
Antimicrobial prophylaxis	4	1,4
Available imaging exams	3	1,0
Phase III	232	82,9
Register confirmation and instrument count	7	2,5
Swab count	2	0,8
Sample identification	2	0,8
Problems with equipment	5	1,8
Review of concerns regarding recovery	216	77,1

The checklist favors the ordering and standardization of procedures, sharing of information among the team, exchange of knowledge and concerns, preparedness for possible undesirable events, and reduce discomfort caused by unexpected situations[2,8]. Thus, effective practices, improvement in communication quality and reduction of risks, adverse events and complications of surgical interventions occur, which improve patient safety[1,2,8].

The initial step for surgical safety consists of the implementation of the checklist instrument to all surgical patients. The presence of the checklist in the electronic medical records represented 97.4%, a higher percentage than that reported in an international study[13], with 83.3%, and a national study[14], which reported only 60.5%. Inserting the instrument in the institutions was considered low cost, due to inserting the instrument in the medical records and its execution by a professional, however there is still a gap in the installation of the checklist[3,9]. In this study, the instrument was not found in the medical record of seven cases, which reflects a small percentage, however it is necessary that the implantation reaches all patients, in order to implement the Checklist.

The nursing technician was the main professional responsible for employing the checklist, as portrayed in one study[5], assigning great responsibility to these professionals. Therefore, it is extremely important that nurses constantly participate in health education activities in order to teach and reinforce the correct way of performing the check, and encourage the team to pause the procedure when the phases are not in compliance. Researchers emphasize the relevance of communication among professionals and emphasize that interrupting surgery in one of the stages, depending on the professional who interrupts, can generate conflicts among the team[3,6,9].

The full completion of the instrument occurred in 12.9% of the surgeries evaluated, a difficulty also evidenced in studies performed in two teaching hospitals in Natal (RN), [14] which showed a 3.5% compliance in 375 gynecological and urological surgeries, and in Spain[13], with 27.8% compliance in the 90 procedures evaluated in nine public hospitals. In a study [5] performed in a public hospital in São Paulo which analyzed 30 cardiological procedures, 43% of the instruments were in compliance.

This deficit in the checklist compliance, with only 12.9% of the instruments with full completion and 86.4% with partial completion, indicates the need for educational actions with the whole team in the surgical units, and to clarify the application of the instrument, which may favor surgical safety and the quality of the care provided, as well as to encourage professionals and show their importance in the process as well as the positive results after the introduction of the protocol.

Considering the three phasess, the phasse which had the greatest compliance in this study was phase II, referring to the confirmation, with 92.5% completion, corroborating with a Spanish research[13], which presented 51.8%. Next, the identification, related to the first phase, resulted in 90.4%, and in Spain[13], 49.3%. The lowest compliance was the third phase, called the Register, with only 17.1%, contrasting with 43.1% in the Spanish study[13] and with a study[15] conducted in Belo Horizonte (MG), which showed compliance of less than 50% in all items of this phase. There was divergence with a national study[14], which evidenced that phase I had less completion. The analysis of the phases with other studies[5,16,17] was made difficult by the modification that some institutions made to the Checklist. Thus, there were four diverging stages in our instrument.

One study[13] highlights the exhaustion of the professionals and the absence of the responsible surgeon as causes of the lower compliance to phase III of the checklist. This phase

Table 3. Distribution of surgeries according to the main specialties in relation to inadequate phases in the checklist.

	Surgical specialties						P*
	Otorrino	Ortho.	Ped.Sur	Ofthalmo.	Urology	Other	
Inadequate Phase I	9 (9,7%)	7 (11,1%)	5 (7,0%)	7 (23,0%)	1 (4,0%)	2 (22,2%)	0,248
Inadequate Phase II	4 (4,3%)	6 (6,3%)	2 (4,7%)	1 (3,2%)	0 (0,0%)	1 (11,1%)	0,895
Inadequate Phase III	78 (83,9%)	53 (84,1%)	37 (86,0%)	24 (77,4%)	21 (91,3%)	07 (77,8%)	0,627

*Fisher exact test.

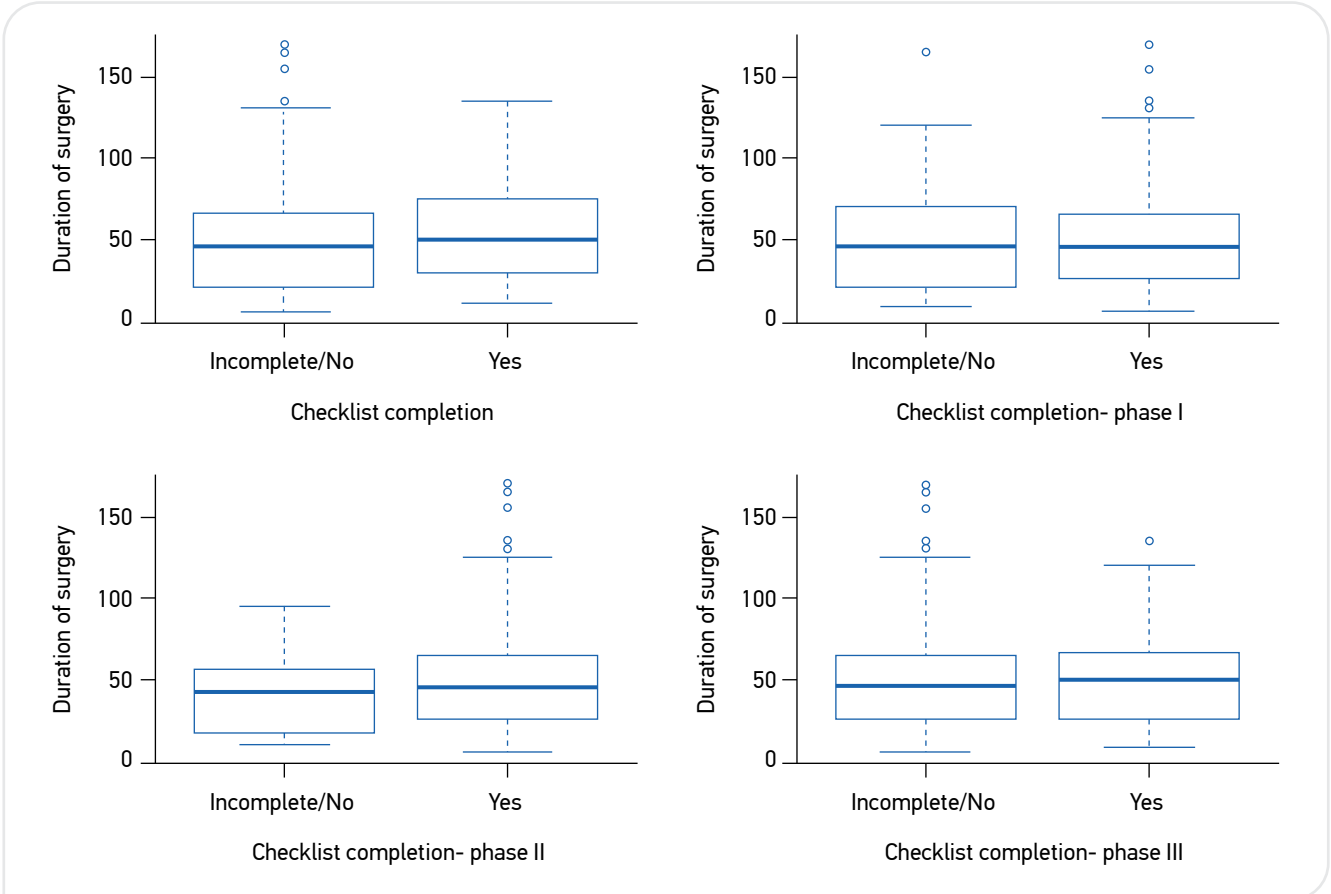

Figure 1. Boxplot of surgery duration (in minutes) according to the completion of the checklist. Botucatu, Brazil, 2018.

is not less important than the others; on the contrary, it addresses relevant issues, such as the counting of swabs and instruments, since the retention of these objects still occurs in great proportion[3,18]. In a study[18] performed with 2,872 physicians, 4,547 cases of inadvertent retention of foreign bodies were reported in surgical procedures, 68% of which were large and small swabs, 22% were gauzes and 5% were surgical instruments.

Among the19 items evaluated, the "Revision of concerns regarding recovery" corresponded to 77.1%, which was not completed, with a lower compliance to phase III. This data demonstrate the attention focused only at the phase of the procedure, generating a deficit in the follow-up of care in anesthetic recovery and in the postoperative period, which can influence care comprehensiveness, fragmenting care to the surgical patient. On the other hand, in other studies, the items that had the lowest compliance were "Marked surgical site" [14] and "Swab count" [17].

The surgical time and the specialties did not influence checklist compliance. These data indicate that there is no single cause for the inadequacy of the instrument, and that complete cooperation is essential for the proper implementation of the instrument, and that health education activities should be performed in the service and involve all professionals. The literature highlights that the absence of support from supervisors, the lack of knowledge regarding the surgical safety protocol, lack of team training, poor communication and the rejection of some professionals to verbally respond to the items in the checklist were the main problems listed related to noncompliance[6-9,19]. It was found in one study[8] that professionals reported time as an obstacle to the execution of the instrument due to the work overload.

Researchers consider that the lack of participation of the team in the implementation of the checklist reflects the culture of individual work, which unfortunately is still present today, as well as the trivialization of the instrument, issues that limit compliance to the procedure[6-7,19]. A study[15] which evaluated 30 procedures, highlighted that the multiprofessional team did not participate in any of the checklists, and another study[16] identified that most of the checks occurred individually and non verbally. Independent work impairs communication between the team, which may lead to conflicts, and thus interfere with the work environment and the outcome of the care provided[6,19].

An important factor in relation to checklist compliance is the safety culture of the patient inserted in the multiprofessional team, starting from the training of the professionals, with continuous and permanent education actions for the whole team. One study[20] showed an increase from 7.9 to 96.9% in the correct use of the checklist after training involving the surgical team. Therefore, the training of the professionals had positive results, with an impact on the care provided. In contrast, after training in a public teaching hospital, there was a reduction in protocols left blank, however, the number of incomplete instruments increased[12].

Thus, educational actions can be favorable or unfavorable to checklist compliance, depending on the method, duration and topics as well as the professionals involved[7]. The methodology of problematization addressed in study[19] reproduces an interesting strategy for training in the surgical unit, since it encourages theparticipation of all team members. Firstly, they observe reality and recognize the difficulties they face on a day-to-day basis. Interventions are then developed through joint analysis, based on the origins of the problems and why they occur. Finally, what was proposed is put into action, seeking changes in the work reality of the multiprofessional team.

The use of secondary data is a limitation of this study, however assessing checklist compliance is the first step in analyzing the impact on the quality of care provided. Therefore, new studies must be carried out.

CONCLUSION

The Safe Surgery Checklist represents a worldwide standard of surgical safety, preventing errors, adverse events, complications, and even deaths in operative care, however, it is necessary for the surgical teams to be conscientious and involved in order to apply the instrument properly and thus ensure safety to the patient.

Complete compliance to the checklist occured in 12.9% of the surgeries evaluated. The completion differed between the steps, with phase III showing less compiance. in In most cases, the partial completion indicates the need to deconstruct the barriers to this compliance by empowering the nursing team to conduct the checklist, educational actions with the teams and understanding the need for its application, which may benefit and increase the quality of the care provided. Surgical time and specialty did not influence compliance to the application of the Checklist, which indicates that there is not a single cause that explains the inadequte completion of the instrument.

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