

ORIGINAL ARTICLE

## EVALUATION OF RISK FACTORS FOR PERIOPERATIVE COMPLICATIONS RELATED TO PATIENT SAFETY

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### ABSTRACT

**Objective:** To evaluate risk factors for perioperative complications related to patient safety through the use of an evaluation instrument.

**Method:** Cross-sectional exploratory study conducted in a hospital in the state of Ceará, from March to April 2017.

**Results:** Glasgow and Aldrete-Kroulik scales not used and absence of patient identification. In more than 69% of the sample, the consent form for surgery was not signed and the anesthesiologist was not present during the surgical procedure. There was a statistically significant relationship between preoperative complaints and elective and emergency surgeries ( $p < 0.001$ ).

**Conclusion:** Several risks can lead to complications in the perioperative period, which can be avoided if health professionals follow the World Health Organization's patient safety recommendations, associated with the implementation of protocols and checklists.


**DESCRIPTORS:** Risk factors; Surgical Procedures; Perioperative Care; Patient safety.


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## **AValiação de Fatores de Risco para Complicações no Perioperatório Relacionadas à Segurança do Paciente**

### **RESUMO**

*Objetivo: avaliar fatores de risco para complicações perioperatórias relacionadas à segurança do paciente, mediante uso de um instrumento de avaliação.*

*Método: estudo transversal com abordagem exploratória realizado em um hospital no estado do Ceará, de março a abril de 2017.*

*Resultados: destaca-se a não aplicação das escalas de Glasgow e Aldrete-Kroulik e a ausência de identificação do paciente. Em mais de 69% da amostra não se obteve o termo de consentimento para realização da cirurgia e o anestesiológico não se manteve presente na realização do procedimento cirúrgico. Houve significância na relação entre a verificação das queixas no pré-operatório e as cirurgias eletivas e de urgência ( $p < 0,001$ ).*

*Conclusão: diversos riscos podem ocasionar complicações no perioperatório, estes são evitáveis se os profissionais seguirem as recomendações de segurança do paciente orientadas pela Organização Mundial de Saúde, aliada à adoção de protocolos e checklists. Esse estudo demonstra quais resultados podem ser obtidos ao se adotar tais procedimentos.*

**DESCRITORES:** Fatores de Risco; Procedimentos Cirúrgicos Operatórios; Assistência Perioperatória; Segurança do Paciente.

## **EVALUACIÓN DE FACTORES DE RIESGO PARA COMPLICACIONES EN LAS PERIOPERATIVAS ASOCIADAS A LA SEGURIDAD DEL PACIENTE**

### **RESUMEN:**

*Objetivo: analizar factores de riesgo para complicaciones perioperativas asociadas a la seguridad del paciente, por medio de uso de un instrumento de evaluación.*

*Método: estudio transversal con abordaje exploratorio que se realizó en un hospital en el estado de Ceará, de marzo a abril de 2017.*

*Resultados: se destaca la no aplicación de las escalas de Glasgow y Aldrete-Kroulik y la ausencia de identificación del paciente. En más de 69% de la muestra no se obtuvo la autorización de consentimiento para realizar la cirugía y el anesestsiólogo no se mantuvo presente en la realización del procedimiento quirúrgico. Hubo significancia en la relación entre la verificación de las quejas en el preoperatorio y las cirugías electivas y de urgencia ( $p < 0,001$ ).*

*Conclusión: diversos riesgos pueden ocasionar complicaciones en el perioperativo, pero se los pueden evitar si los profesionales siguen las recomendaciones de seguridad del paciente por medio de orientación de la Organización Mundial de la Salud, añadiéndose a eso la adopción de protocolos y checklists. Ese estudio muestra cuáles resultados se obtienen cuando se adoptan esos procedimientos.*

**DESCRIPTORES:** Factores de Riesgo; Procedimientos Quirúrgicos Operatorios; Asistencia Perioperativa; Seguridad del Paciente.

## INTRODUCTION

The World Alliance for Patient Safety was established during the 57th World Health Assembly with the purpose of conducting patient safety programs worldwide, establishing objectives such as the development of mechanisms to improve patient safety, creation of global standards, protocols and guidelines, as well as the development of investigations<sup>(1)</sup>.

In order to meet the goals of this proposal, Brazil' Ministry of Health established the National Patient Safety Program (PNSP) to improve health care quality and safety through the implementation of six goals: patient identification; prevention of pressure ulcers; safety in drug prescription, use and administration; handwashing in health services; falls prevention and safe surgery protocols<sup>(2)</sup>.

In 2008, Brazil took significant steps towards the implementation of safe surgery protocols when the Ministry of Health adhered to the Safe Surgeries Save Lives campaign launched by the World Health Organization (WHO), whose main objective was the introduction of standardized checklists developed by experts into the hospitals, with the purpose of contributing to safe surgeries and the minimization of errors and patient harm<sup>(3)</sup>.

These initiatives deserve special mention, since hospital adverse events (AEs) generally occur in 4 to 16% of all hospitalized patients, and more than half of them are related to surgical care<sup>(5-6)</sup>. In industrialized countries, surgical complications occur in 3- 16% of the procedures in patients undergoing surgery, with a mortality rate of 0.4-0.8 %<sup>(4)</sup>.

Therefore, perioperative complications are real risks for patients undergoing surgery, and some factors that trigger these complications include patients' clinical status, stage of patients' diseases, type of anesthesia and other drugs administered, invasive procedures and health care team's proper training to provide safe and high quality care<sup>(7-8)</sup>.

Health professionals, including the nursing team, play a key role in surgical practice. Therefore, knowledge of the main risk factors that contribute to complications of surgical procedures is crucial for the implementation of safe practices. The present study aimed to evaluate the risk factors for perioperative complications related to patient safety in a hospital in Ceará that is a referral center for traumatology and general surgery.

## METHOD

Cross-sectional study with an exploratory approach carried out in a hospital in the state of Ceará, covering the entire Macroregion of Maciço de Baturité, composed of 13 municipalities.

A total of 187 people underwent surgical procedures in the first quarter of 2017, an average of 62 surgeries per month. Each individual underwent only one surgical procedure.

The sample was calculated with a margin of error of 5%, and considering a percentage of 16% of all the individuals with complications, according to data from the Anvisa (Brazilian Health Regulatory Agency) that consider a complication rate between 14% and 16%<sup>(9)</sup>. This led to a sample of 98 subjects.

The eligibility criteria were as follows: patients who underwent surgical procedures and agreed to participate in the study. Patients with serious health conditions and/or who faced imminent risk of death prior to the surgical procedure were excluded. All patients who underwent surgical procedures, regardless of gender, age or any other variable were monitored during the study.

A tool based on a checklist built by the WHO, through the World Alliance for Patient Safety, and on studies on safe surgery protocols such as those developed in specific hospitals

was used in this study<sup>(10-13)</sup>. A more comprehensive identification of the risk factors for trans-operative complications related to patient safety was attempted, through the assessment of patients' conditions, and procedures (whether or not they have been performed) that might pose risks for postoperative complications. All interventions and care procedures, whether or not performed, were marked in the instrument.

The perioperative evaluation instrument used consists of three parts, namely: preoperative, trans-operative and postoperative. There is also a space for patient information such as name, gender, age, and address. The pre-operative part of the tool evaluates patients before referral to the surgical center, checking attitudes such as the questioning about comorbidities and health complaints, use of the Glasgow scale and presence of identification wristbands.

In the intraoperative period, confirmation of the procedure and patients' names are checked, as well as the administration of prophylactic antibiotics and count of instruments. The last part of the instrument assesses the postoperative period, that is, events that occurred from patient admission to discharge from the recovery room/post-anesthesia care unit regarding the Glasgow and Aldrete-Kroulik scales, evaluation of wound dressing conditions, care related to the type of anesthesia and patient complaints. The patients were accompanied during the completion of the tool for the verification of all the procedures and/or conducts performed.

The results were grouped and organized into tables using the Microsoft Excel 2010 software and processed with the use of the Epi Info™ program 7.2.1.0.

The present study was submitted to and approved by the Research Ethics Committee of Universidade da Integração Internacional da Lusofonia Afro-Brasileira under protocol no 2.195.693.

## RESULTS

Ninety-eight (98) patients who underwent surgical procedures were included in the study, of which 64 (65.3%) were male; 36 (36.7%) were aged 31-50 years, and regarding the city or origin, 34 (34.7%) were from Aracoiaba and 22 (22.4%) from Baturité, as shown in Table 1.

Table 1 – Sociodemographic characterization of patients who have undergone surgical procedures in a referral center for traumatology and surgery in the Maciço de Baturité Region, Ceará, Brazil, 2017 (continues)

Variables	Categories	N	%
Gender	Male	64	65.3
	Female	34	34.7
City	Aracoiaba	34	34.7
	Aratuba	2	2
	Baturité	22	22.4
	Capistrano	12	12.2
	Itapiúna	5	5.1
	Mulungu	7	7.1
	Redenção	1	1
	Pacoti	11	11.2

	Palmácia	2	2
	Pindoretama	2	2
Age	<=18	13	13.3
	>18 and <=30	28	28.6
	>30 and <=50	36	36.7
	>50	21	21.4

Source: Research data, 2017.

Of the surgical procedures performed, 59 (60.2%) occurred on the date of the patient's hospitalization and the others were performed on days subsequent to hospitalization. Preoperative evaluation showed that the hospital beds had no patient identification, and it should be mentioned that identification wristbands is not a regular practice in the referred hospital. Trichotomies were performed according to the type of surgery, site and need, and were conducted in 67 (60.4%) surgical procedures.

Blood type was not known before surgery in 87 (88.8%) of the participants evaluated. The Glasgow scale and the Aldrete-Kroulik scale were not administered to the patients in any surgical period, and fluid balance was not measured in the analyzed sample.

Regarding the evaluation of preoperative items, positive results were obtained for the items verification of recommended surgical procedure, laboratory tests and allergy testing, as they were performed in 100 % of the procedures. Moreover, central venous access was previously obtained through percutaneous puncture, and all patients' jewelry was removed (Table 2).

Table 2 – Description of verification items related to patient safety in the preoperative period of surgery in a referral center for traumatology and surgery of the Maciço de Baturité Region, Ceará, Brazil, 2017

Variables	Yes	%	No	%
Surgeries on the date of admission	59	60.2	39	39.8
Trichotomy	67	68.4	31	31.6
Verification of comorbidities	67	68.4	31	31.6
Blood typing	11	11.2	87	88.8
Equipment testing	80	80.6	18	18.4
Signed consent form	30	30.6	68	69.4
Verification of complaints	27	27.5	71	72.4
Radiological examinations	87	88.8	11	11.2
Dental prosthesis	87	88.8	11	11.2

Source: Research data, 2017.

Confirmation of the procedure and surgical site was performed in 100% of the procedures. However, there were low rates of confirmation of the patients' names, since the names of 60 (88.2%) patients submitted to surgeries were not confirmed.

Evaluation of the anesthesiologists' presence in the operating room during the entire surgical procedure showed worrying results: in 69 (70.4%) procedures anesthesiologists left the operating room after anesthetic induction or throughout the procedure, with complete follow-up of anesthesiologists occurring in only 29 (29.5%) procedures. Maintenance of anesthesia was not performed in five (5.1%) procedures. Thus, further amounts of anesthetic were required during surgery. Of the total number of procedures conducted, 69 (70.4%) were performed with spinal anesthesia induction and 19 (19.4%) through induction of the brachial plexus block.

Antibiotic prophylaxis was performed in all patients, and confirmation of the procedure, count of surgical instruments, counts of dressings and confirmation of the surgical site were also performed in 100% of the patients who underwent surgical procedures. In addition, degermation and antisepsis were performed in the operative field, as well as plate fixation in all patients, and no patient was intubated or suffered life-threatening complications.

Table 3 lists the types of elective and emergency surgeries with variables evaluated in the perioperative period. Of the total number of surgical procedures performed, 84 (85.7%) were elective and 14 (14.2%) were urgent.

Table 3 – The types of surgery and items of verification related to safe surgery in the perioperative period in a referral center for traumatology and surgery in the Maciço de Baturité, Ceará, Brazil 2017 (continues)

Variables		Types of surgeries		Total n (%)	p
		Elective n(%)	Emergency n (%)		
Trichotomy	Yes	59 (88.06)	8 (11.94)	67 (100)	0.329
	No	25 (80.65)	6 (19.35)	31 (100)	
Verification of comorbidities	Yes	58 (86.57)	9 (13.43)	67 (100)	0.722
	No	26 (83.87)	5 (16.13)	31 (100)	
Equipment testing	Yes	68 (85)	12 (15)	80 (100)	0.957
	No	16 (88.89)	2 (11.11)	18 (100)	
Informed consent form	Yes	24 (80)	6 (20)	30 (100)	0.282
	No	60 (88.24)	8 (11.76)	68 (100)	
Verification of complaints in the preoperative period	Yes	18 (66.67)	9 (33.33)	27 (100)	<0.001
	No	66 (92.96)	5 (7.04)	71 (100)	
Confirmation of fasting time	Yes	20 (90.91)	2 (9.09)	22 (100)	0.656
	No	64 (84.21)	12 (15.79)	76 (100)	
Verification of complaints in the intraoperative period	Yes	17 (77.27)	5 (22.73)	22 (100)	0.198
	No	67 (88.16)	9 (11.84)	76 (100)	
Confirmation of patient's name	Yes	33 (86.84)	5 (13.16)	38 (100)	0.799
	No	51 (85)	9 (15)	90 (100)	
Cleaning of the operating room performed	Yes	70 (87.50)	10 (12.50)	80 (100)	0.488
	No	14 (77.78)	4 (22.22)	18 (100)	
Anesthesiologist in the operating room	Yes	26 (89.66)	3 (10.34)	29 (100)	0.684
	No	58 (84.06)	11 (15.94)	69 (100)	
Maintenance of patient anesthesia	Yes	80 (86.02)	13 (13.98)	93 (100)	1.000

	No	4 (80)	1 (20)	5 (100)	
Verification of complaints in the postoperative period	Yes	67 (85.90)	11 (14.10)	78 (100)	1.000
	No	17 (85)	3 (15)	20 (100)	
Signs of shock	Yes	67 (85.90)	11 (14.10)	78 (100)	1.000
	No	17 (85)	3 (15)	20 (100)	

Source: Research data, 2017.

Non-verification of patients' health complaints occurred during elective surgeries. This finding was statistically significant, since patients in stable health conditions during elective surgery are often not asked about their current health conditions. Moreover, it was found that questioning about patients' health conditions occur mainly in the postoperative period.

The informed consent form was used in more than half of emergency surgeries, whereas in elective surgeries it occurred in less than 50% of the cases. Patients or caregivers' consent was not obtained in most surgical procedures performed.

Comorbidities were verified in most surgical procedures. Equipment testing and cleaning of the operating room were also observed. However, surgeries are still performed without equipment testing and in rooms without proper hygiene, and this finding is not only related to urgent surgical procedures, but also to elective surgical procedures.

Despite the verification of health complaints in the preoperative period, signs of shock were detected in most patients undergoing both elective and emergency surgeries.

## DISCUSSION

Referral centers for traumatology often provide assistance to male victims in road accidents<sup>(14)</sup>. This finding may justify the prevalence of male individuals in the present study.

However, studies that evaluated hospital adverse events related to surgical procedures found a prevalence of female individuals undergoing surgical procedures<sup>(8,15)</sup>. Nonetheless, the mean age of the participants of the aforementioned studies is consistent with the age of the patients evaluated in the present study.

The cities of Aracoíaba and Baturité jointly account for 57.1% of all surgical procedures performed in the region because they have the largest populations among the cities in the hospital coverage area, and are located near the hospital where these procedures are performed.

Patient identification in the hospital environment is a common problem. A study conducted in southern Brazil found no identification in the hospital beds of the 1,068 patients evaluated<sup>(16)</sup>. The hospital investigated in that study does not include patient identification practices. Confirmation of the patients' names was not performed in more than half of the surgical procedures in the referred hospital. This is a serious problem that may result in a wide range of errors and even adverse events.

Correct patient identification from admission to discharge is one of the goals of the PNSP. Moreover, the PNSP safe surgery protocol contemplates the confirmation of the patient's name, place of surgery, name of the procedure to be performed and patient consent prior to anesthetic induction.

Patients were not asked about their comorbidities in approximately 30% of the

procedures conducted in this study. In addition, regarding the verification of health complaints in the preoperative and intraoperative periods, it did not occur in more than 70% of the surgical procedures. There were higher rates of verification of such complaints in the postoperative period. Recent studies showed that surgical patients with comorbidities may have complications throughout the perioperative period<sup>(8,17)</sup>.

The health care team, which includes surgical center nurses, is responsible for assessing patients' characteristics, comorbidities, health complaints, laboratory testing and/or diagnoses. Such evaluation is essential for ensuring a safer surgical procedure.

The Glasgow and Aldrete-Kroulik coma scales are widely used in the hospital setting. Low adherence to these scales may be associated with lack of information and with the fact that health professionals are unprepared to use these instruments, which prevents the delivery of more specialized care and interferes with the quality of patient care and safety<sup>(18)</sup>.

Surgical antibiotic prophylaxis was performed in 100% of the patients, resulting in lower risks of postoperative infection, as well as in reduced morbidity and lethality of surgical procedures. Other studies corroborate the data obtained in the present study, with high adherence of antibiotic prophylaxis among preoperative patients<sup>(8,17,19)</sup>.

A study that analyzed antimicrobial prophylaxis in 700 medical records of patients who underwent clean surgeries found that antimicrobial administration was performed in 86.6% of them, reducing infection rates among patients. The adequate use of antimicrobial prophylaxis prevents SSIs. However, its efficacy depends on essential factors such as the timing of prophylaxis onset, duration of surgery and the need for intra- and postoperative repetition<sup>(20)</sup>.

Fasting was not verified in more than 70% of the patients, and so they underwent the surgical procedures without confirmation of fasting. Bronchoaspiration rarely occurs, but care should be taken to ensure that it is always prevented. Preoperative fasting protocols suggest short periods of food deprivation, especially for clear fluids or carbohydrate drinks, without increase in the number of trans-operative pulmonary aspirations<sup>(21)</sup>. According to the records, the standard medical guidance for elective surgeries was an 8-hour fasting, even though this was not observed.

An important and critical finding is the fact that anesthesiologists did not stay in the operating room throughout the surgical procedure. Contrasting with this finding, other studies reported the continuous presence of anesthesiologists in the operating room for the verification of vital signs, hemodynamic and neurological status of the patient. Neurophysiological evaluation aims to avoid intraoperative and postoperative complications, and it is the same with previous evaluations performed in special surgical procedures<sup>(22-23)</sup>.

Like all other health care agencies, Anvisa is concerned with the safety of surgeries performed in health services and stresses the relevance of the continuous presence of qualified and attentive anesthesiologists during all phases of the surgical procedure, as well as the entire surgical team, to improve safety and reduce the number of deaths and surgical complications<sup>(1)</sup>.

There was a statistically significant relationship between preoperative complaints and elective and emergency surgeries ( $p < 0.001$ ), as follows: 33.33% of the verified complaints occurred in emergency surgical procedures and more than 90% of the non-verified complaints concerned elective surgical procedures. This indicates that patients who will undergo elective surgical procedures and have health complaints to be evaluated by the health care team are at high risk for complications.

The Systematization of Perioperative Nursing Care (SAEP) is responsible for the verification of patient complaints, as it identifies several risk factors related to surgeries, so that the team is prepared for possible complications. A study conducted in a hospital



in Santa Catarina showed that nurses guided by the SAEP had a broader understanding of the patients' health status and were more capable of delivering continuous and safe care<sup>(22)</sup>.

The operating rooms were cleaned in more than 80% of the surgical procedures. However, lack of cleaning of the operating rooms was observed in elective and emergency surgeries, which is a matter of concern given the amount of time available for the preparation of the health team. This was also observed in a teaching hospital in Goiânia where the operating room was not previously cleaned in 87.5% of the surgical procedures performed<sup>(24)</sup>.

Failures may occur during the perioperative period. Thus, continuous evaluation of the surgical centers is required to ensure they are in adequate conditions for the patients. The absence of a care protocol or the WHO's Surgical Safety Checklist possibly influences the occurrence of adverse events in surgeries. Therefore, it is necessary to raise awareness and empower the health teams to the adoption of strategies that can improve surgical care<sup>(25)</sup>.

One limitation of this study is the fact that it was performed in only one hospital, and thus the data obtained cannot be generalized. Thus, it is suggested that further studies on this issue are conducted.

## CONCLUSION

The present study provided an overview of the risk factors for perioperative complications related to patient safety in a referral center for traumatology and general surgery, making it possible to improve safe practices within the hospital and in similar health institutions.

Nurses are responsible for many of the actions not performed in surgical procedures, especially regarding the implementation of patient safety protocols. The items investigated concern actions that must be implemented to ensure safe care, but institutions take time to change, and a proactive behavior of health professionals and managers is also necessary. The important findings of this study should be considered, given the need for the implementation of safer surgical care.

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