Patient safety in perioperative nursing care and nursing taxonomies

Segurança do paciente na assistência de enfermagem perioperatória e as taxonomias de enfermagem

Seguridad del paciente en la atención de enfermería perioperatoria y las taxonomías de enfermería

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ABSTRACT
Objective: to analyze the strategies of the surgical safety checklist proposed by the World Health Organization and identify the nursing taxonomies, as input to a model for recording and operationalizing the Systematization of Perioperative Nursing Care (SAEP). **Method:** this methodological study aimed to identify the links with nursing taxonomies through the SAEP. The main terms of the surgical safety checklist were listed, and the nursing taxonomies, NANDA-International nursing diagnoses, classification of nursing outcomes and interventions were consulted. **Results:** a model was developed for recording and operationalizing the SAEP as applied to patient safety in perioperative nursing care, by each phase in a normal surgical procedure flow. **Conclusion:** the proposed model for SAEP, considered the NANDA-I, NOC, and NIC taxonomies, which will help nurses in clinical reasoning when evaluating and implementing measures to prevent incidents.
Descriptors: Perioperative Nursing; Nursing Process; Patient Safety; Standardized Nursing Terminology.

RESUMO
Objetivo: analisar as estratégias da lista de verificação de segurança cirúrgica proposta pela Organização Mundial de Saúde e identificar as taxonomias de enfermagem, a fim de subsidiar um modelo para registro e operacionalização da Sistematização da Assistência de Enfermagem Perioperatória (SAEP). **Método:** estudo metodológico que visa identificar as ligações das taxonomias de enfermagem, por meio da SAEP. Foram listados os principais termos da lista de verificação de segurança cirúrgica, consultadas as taxonomias de enfermagem, diagnósticos de enfermagem da NANDA-Internacional, classificação dos resultados e das intervenções de enfermagem. **Resultados:** foi elaborado um modelo para registro e operacionalização da SAEP aplicado a segurança do paciente na assistência de enfermagem perioperatória, conforme cada fase de um fluxo normal de um procedimento cirúrgico. **Conclusão**: no modelo proposto para SAEP, foram contempladas as taxonomias NANDA-I, NOC e NIC que auxiliarão o enfermeiro no raciocínio clínico para avaliação e implementação de medidas preventivas de incidentes.
Descritores: Enfermagem Perioperatória; Processo de Enfermagem; Segurança do Paciente; Terminologia Padronizada em Enfermagem.

RESUMEN
Objetivo: analizar las estrategias de la lista de verificación de seguridad quirúrgica propuesta por la Organización Mundial de la Salud e identificar las taxonomías de enfermería, con el fin de subsidiar un modelo de registro y operacionalización de Sistematización de la Atención de Enfermería Perioperatoria (SAEP). **Método:** estudio metodológico que tiene como objetivo identificar los vínculos de las taxonomías de enfermería a través del SAEP. Se enumeraron los principales términos del checklist de seguridad quirúrgica, consultando las taxonomías de enfermería, diagnósticos de enfermería de NANDA-International, clasificación de los resultados y de las intervenciones de enfermería. **Resultados:** se desarrolló un modelo de registro y operacionalización del SAEP aplicado a la seguridad del paciente en el cuidado de enfermería perioperatoria, de acuerdo con cada fase del flujo normal de un procedimiento quirúrgico. **Conclusión:** en el modelo propuesto para SAEP, se consideraron las taxonomías NANDA-I, NOC y NIC, que ayudarán al enfermero en el razonamiento clínico para la evaluación e implementación de medidas preventivas de incidentes.
Descriptores: Enfermería Perioperatoria; Proceso de Enfermería; Seguridad del Paciente; Terminología Normalizada de Enfermería.

INTRODUCTION

The World Health Organization (WHO) defines patient safety as reducing to a minimum acceptable the risk of unnecessary harms associated with health care[1]. It is known that patient safety is one of the WHO priority issues. In October 2004, the WHO launched the "World Alliance for Patient Safety" project, with the objective of raising awareness regarding safety in health care[2].

The WHO launches frequent global challenges; in 2009, it was "Safe Surgeries Save Lives", devoted to surgical safety fundamentals and practices, which aims at increasing the quality standards and ensuring safety in surgical interventions, including the following: prevention of surgical site infections; safe anesthesia; safe surgical teams; and surgical assistance indicators[3].

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In view of this, in 2019, the Brazilian Ministry of Health (*Ministério da Saúde*, MS), in partnership with the WHO Pan American Health Organization (PAHO), launched the implementation manual of measures for the patient safety project called "Safe Surgeries Save Lives". This manual presents a "Surgical safety checklist" that was developed to help the surgical team reduce occurrence of harms in the patients[3,4].

Nursing professionals stand out in the surgical team regarding application of the surgical safety checklist, by employing strategies and demands in benefit of patient safety[5-7]. However, nurses need to structure their methodological work tool, which is the Nursing Process (NP) to solidify and ensure patient safety in perioperative Nursing care, which should be guided by the precepts of safety and quality of care.

Resolution 358/2009 of the Federal Nursing Council (*Conselho Federal de Enfermagem*, COFEN) defines the NP as a methodological instrument that guides Nursing care, based on the practical application of Nursing theories, to be developed in five stages, namely: data collection or Nursing history; Nursing diagnosis; Nursing care planning; implementation; and Nursing assessment[8]. The NP enables nurses' clinical reasoning, care organization and documentation of the professional practice and, consequently, evidence-based safe care[9,10].

In the perioperative context, the NP is called Systematization of Perioperative Nursing Care (SPNC)[11]. The SPNC is a care model proposed with the intention of facilitating perioperative Nursing care, representing an instrument that contains individual patient information, presenting identification data, anamnesis, physical examination and Nursing diagnosis, as well as Nursing interventions, outcomes and assessment[11,12].

The SPNC is fundamental because it provides planned integration of the multidisciplinary health team with the patient/family members during the entire surgical process[11,12]. Due to its relevance, the SPNC became mandatory as per the COFEN in 2002[13].

A number of studies point to the need to foster patient safety in interface with the SPNC[9,10,12,14-18], in addition to using the Nursing taxonomies to assist in clinical-diagnostic reasoning based on the NP stages[9].

Given such prerogatives, this study is justified in analyzing the strategies of the surgical safety checklist proposed by the WHO and cataloging the Nursing taxonomies in order to support a model for recording and operationalizing the SPNC that promotes patient safety in the perioperative context; in addition to the need for an interface between the patient safety protocols and the NP, as well as the use of Nursing taxonomies to assist in clinical reasoning and recording of Nursing actions.

In this regard, this study aims at analyzing the strategies of the surgical safety checklist proposed by the WHO and at identifying the Nursing taxonomies in order to support a model for recording and operationalizing the SPNC that promotes patient safety.

METHOD

A methodological study, structured in two parts: 1) The strategies included in the surgical safety checklist described in the "Safe Surgeries Save Lives" manual, proposed by the WHO, were analyzed. The surgical safety list has three phases, each corresponding to a specific moment in the normal flow of a procedure, namely: the period before anesthetic induction (entry), the period after induction and before the surgical incision (surgical pause) and the period during or immediately after wound closure, but prior to removal of the patient from the operating room (exit)[3-4]; 2) Subsequently, three Nursing taxonomies were consulted, namely: the classification of Nursing Diagnoses (NDs) by NANDA International (NANDA-I) that organizes concepts related to actual or potential human responses to health conditions/life processes, or a vulnerability to this response[19]; the Nursing Outcomes Classification (NOC), which brings together a standardization of outcomes sensitive to Nursing interventions that make it possible to measure the patient's clinical status[20]; and the Nursing Interventions Classification (NIC), which groups a set of interventions that consist of a treatment based on clinical judgment and knowledge, which nurses will use to prepare the care plan[21].

To identify the Nursing classifications related to the surgical safety checklist strategies, the following stages were established: a) The main terms contained in the surgical safety checklist were listed, according to each phase of the normal flow of a procedure (before anesthetic induction; before the surgical incision; before the patient exits the operating room); b) The possible NDs were mapped according to the terms previously listed, consulting the NANDA-I (2021-2023) taxonomy; c) The NDs supported selection of the outcomes sensitive to the Nursing interventions, based on the NANDA-I/NOC/NIC relation; d) Selection of the NIC interventions based on the NANDA-I/NOC/NIC relations and on the strategies established in the surgical safety checklist;

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e) Through consensus among the study researchers, the titles of the Nursing diagnoses, outcomes and interventions were established.

RESULTS AND DISCUSSION

The SPNC presents itself as a legal framework[8] of the Nursing profession, as it guides care organization and recording of the professional practice documentation, which makes Nursing care safer[9,12,14]. It is better carried out when associated with the Nursing taxonomies[22,23]. The Nursing taxonomies or classifications provide benefits for the Nursing practice, conduction of clinical reasoning, qualification of information, and recording and organization of the care provided[22,23].

Thus, based on the surgical safety checklist proposed by the WHO, the elements of the Nursing practice (Nursing diagnoses, interventions and outcomes) were identified based on the NANDA-I, NOC and NIC taxonomies, in order to elaborate a model to record and operationalize the SPNC capable of enabling risk identification and of fostering patient safety in the perioperative context.

Figure 1 presents a model for a structured SPNC based on patient safety strategies regarding the first phase of the normal flow of a procedure, according to the surgical safety checklist proposed by the WHO, which corresponds to "before anesthetic induction".

Safety when identifying the patient	**NANDA-I**	**Impaired verbal communication (00051)**[19]
	NOC	**Communication (0902)**[20] **Indicators:** Accurate interpretation of messages received. **Client Satisfaction: Communication (3002)**[20] **Indicators**: Staff introduce self; Alternative communication methods used as necessary.
	NIC	**Admission Care (7310)**[21] **Training time and level required for execution:** Attending Nurse, 16-30 minutes[21] **Patient Identification (6574)**[21] **Training time and level required for execution:** Attending Nurse, 15 minutes or less[21]
	Prescription	Introduce yourself and your role in providing care[21] Explain to the patient the importance of proper identification throughout their permanence in the health institution[21] Identify the patient using at least two identifiers, such as: patient's full name; full name of the patient's mother; patient's date of birth; or patient's medical record number[21]
Risk of blood loss	**NANDA-I**	**Risk for shock (00205)**[19]
	NOC	**Blood Loss Severity (0413)**[20] **Indicators:** Decreased hemoglobin (Hgb); Decreased hematocrit (Hct); Visible blood loss.
	NIC	**Bleeding Precautions (4010)**[21] **Training time and level required for execution:** Attending Nurse, 31-45 minutes[21]
	Prescription	Verify reserve of blood components or derivatives[3,21] Monitor the hemoglobin/hematocrit levels before and after blood loss, as indicated[21] Monitor vital signs[21]
Risk for aspiration	**NANDA-I**	**Risk for aspiration (00039)**[19]
	NOC	**Aspiration Prevention (1918)**[20] **Indicators:** Identify risk factors. **Respiratory Status: Airway Patency (0410)**[20] **Indicators**: Ability to clear secretions; Respiratory rate; Coughing.
	NIC	**Aspiration Precautions (3200)**[21] **Training time and level required for execution:** Nursing Technician, 15 minutes or less[21]
	Prescription	Keep suction setup available[21]
Questions regarding the patient's allergy	**NANDA-I**	**Risk for allergy reaction (00217)**[19]; **Risk for adverse reaction to iodinated contrast media (00218)**[19]; **Risk for latex allergy response (00042)**[19]
	NOC	**Allergic Response: Systemic (706)**[20] **Indicators:** Laryngeal edema; Hives; Petechiae; Anaphylactic shock.
	NIC	**Allergy Management (6410)**[21] **Training time and level required for execution:** Attending Nurse, 31-45 minutes[21]
	Prescription	Identify known allergies (e.g.: medication, food, insects, environment) and unusual reactions[21] Place allergy identification bracelet on the patient, as appropriate[21] Document all allergies in clinical record, according to protocol[21]

FIGURE 1: Model for the recording and operationalization of the SPNC based on the patient safety strategies of the first phase (before anesthetic induction) of the WHO surgical safety list. Rio de Janeiro, Brazil/Porto, Portugal, 2021.

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In the first phase (before anesthetic induction) of the surgical safety checklist, there is information related to the following: patient identification; demarcation of the surgical site; anesthesia; operation of pulse oximeter; questions about the patient's allergy; risk for aspiration/difficult airway; and risk of blood loss. Based on these strategies of the checklist, the possible NDs that may elucidate nurses in the stratification of risks and support the implementation of preventive measures were listed.

Correct identification of the patient and of the intervention site are fundamental for surgical safety, as the other surgical processes derive from this stage. Demarcation of the surgical site should preferably be done with the patients awake and conscious, involving them in the identification and correct confirmation of the intervention site[3,4].

It is worth remembering that, in health services, patient identification is initiated at hospital admission. Thus, before anesthetic induction, it is important that, in the first stage of the NP (data collection), nurses identify situations that may jeopardize the patient identification process (such as impaired verbal communication), in addition to ensuring that the patient is correctly identified (using a standardized white wristband of the institution placed on one of the patient's limbs so that it is checked before care, with at least two of the following identifiers: patient's full name; full name of the patient's mother; patient's date of birth; patient's record number)[4,24,25]. Professional/Patient and professional/professional communication may guarantee the correct procedure to the patient, preventing errors[23].

The risk of blood loss must be assessed before anesthetic induction, so as to implement measures that prevent physiological disorders such as intraoperative hypovolemia[3]. It is up to the nurse to identify the Risk for shock (00205) ND[19], in order to implement the Nursing interventions[21]. And, during the surgical procedure, the nurse will have to pay attention to the signs and symptoms (tachycardia, hypotension, oliguria) of shock resulting from blood loss[3].

Securing the airways of a patient undergoing general anesthesia is the most critical moment during anesthetic induction. The incidence of aspiration during general anesthesia in elective surgeries was estimated at 2.6 for every 10,000 patients[3]. It is up to the nurse to assess the Risk for aspiration (00039) ND[19] to implement the preventive measures and minimize the occurrence of bronchoaspiration.

Regarding the anaphylactic reactions to anesthetic agents, their occurrence is estimated at 1:10,000 cases. The most common causes of anaphylaxis include neuromuscular blockers, latex, antibiotics, colloids, hypnotics and opioids[3]. This can be prevented by obtaining a correct Nursing history, with the patient's adequate identification and documentation in the medical record, ensuring good communication among the team members. Figure 1 presents the possible Nursing diagnoses and interventions that may be implemented by nurses, in order to contribute with the patient's surgical safety.

Figure 2 provides a model for the recording and operationalization of the structured SPNC by means of the patient safety strategies, in the second phase of the surgical safety list proposed by the WHO, which corresponds to "before the surgical incision".

The safety strategies of the second phase (before the surgical incision) refer to confirmation regarding the following: review of the team members; correct patient identification; correct surgical site; critical planning elements for the surgery (confirmation of the use of prophylactic antimicrobials, provision of complementary imaging tests).

The "Risk for perioperative positioning injury (00087)" ND was approved in the NANDA-I taxonomy in 1994, before publication of the "Safe Surgeries Save Lives" Manual. In the literature, application of the Risk Assessment Scale for the Development of Injuries due to Surgical Positioning (*Escala de avaliação de risco para o desenvolvimento de Lesões decorrentes do Posicionamento cirúrgico*, ELPO)[26] is evidenced, which may assist nurses in clinical reasoning for the identification of this ND and enable the implementation of safety measures.

Regarding the infection that occurs in the surgical patient at the surgery site, it is known as Surgical Site Infection (SSI). SSI contributes to nearly 20% of all the HCAIs. SSIs can increase the assistance-related costs and the hospitalization times from 4 to 7 days, in addition to causing deaths[3]. It is also up to the nurse to identify the Risk for infection (00004) ND[21] and to implement preventive interventions, as described in Figure 2.

Figure 3 presents a model for recording and operationalizing the SPNC that was structured through the safety strategies of the third phase of the surgical safety list proposed by the WHO, which corresponds to "before the patient exits the operating room".

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Perioperative positioning	**NANDA-I**	**Risk for perioperative positioning injury (00087)[19]**
	NOC	**Pre-Procedure Readiness (1921)[20] Indicators:** Knowledge of the risks and potential complications; Skin preparation; Participation in pre-procedure checklist
	NIC	**Surgical Preparation (2930)[21] Training time and level required for execution:** Attending Nurse, 35 minutes[21] **Surgical Precautions (2920)[21] Training time and level required for execution:** Attending Nurse, more than 1 hour[21] **Positioning: Intraoperative (0842)[21] Training time and level required for execution:** Attending Nurse, 35 minutes[21]
	Prescription	Apply surgical safety checklist (before anesthetic induction; before surgical incision; and before the patient exits the operating room)[3,21] Participate in preoperative time out to verify if patient, procedure and site are correct[21] Apply cushioning or avoid exerting pressure on surface areas and apply cushioning on bony prominences[21] Apply a lower-limb safety and restriction bandage, when necessary[21] Apply the ELPO scale[26]
Antimicrobial Prophylaxis	**NANDA-I**	**Risk for infection (00004)[19]; Risk for surgical site infection (00266)[19]**
	NOC	**Risk Control: Infectious Process (1924)[20] Indicators:** Identifies infection risk; Practices hand sanitization
	NIC	**Infection Control (6540)[21] Training time and level required for execution:** Attending Nurse, 35 minutes[21] **Infection Control: Intraoperative (6545)[21] Training time and level required for execution:** Attending Nurse, more than 1 hour[21] **Infection Protection (6550)[21] Training time and level required for execution:** Attending Nurse, 35 minutes[21]
	Prescription	Change sites of central and peripheral IV lines and dressings according to institutional protocol[21] Inspect skin and mucous membranes to check redness, extreme heat and drainage[21] Inspect condition of surgical incision[21]

FIGURE 2: Model corresponding to the recording and operationalization of the SPNC based on the patient safety strategies of the second phase (before the surgical incision) from the WHO surgical safety list. Rio de Janeiro, Brazil/Porto, Portugal, 2021.

The safety strategies provided for in the third phase (before the patient exits the operating room) refer to the recording and review of the procedure performed, such as: compresses and instrumental counts; identification of any surgical sample obtained; review of equipment operation and concerns regarding the postoperative and recovery approach before removing the patient from the operating room.

Before the patient exits the operating room, it is fundamental that the surgical team, including its nurse, review anesthetic or intraoperative issues that may interfere with the patient's postoperative recovery[3]. The objective of this perioperative care stage is the efficient and adequate transfer of critical information for planning the patient's postoperative care plan[3].

In view of this, it is important that nurses identify it as the "Risk for perioperative hypothermia (00254)"[21] ND during SPNC performance, which may assist in the implementation of Nursing actions that favor the patient's postoperative recovery. Hypothermia can increase the infection risk and cause hypocoagulation problems[3]. Chart 3 presents some Nursing interventions that may be implemented to minimize the risks.

The "Risk for delayed surgical recovery" ND was approved in the NANDA-I taxonomy in 2013. The nurse may identify this ND also in the operating room, as this ND presents the following as associated conditions: diabetes mellitus; American Society of Anesthesiologists (ASA) physical status score ≥ 3; extensive surgical procedure; and prolonged surgical procedure. The associated conditions are diagnostic indicators (defining characteristics, related factors, risk factors, associated conditions and at-risk populations) used to identify and differentiate the NDs[19].

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Risk in the postoperative and recovery periods	NANDA-I	Risk for perioperative hypothermia (00254)[19]; Risk for delayed surgical recovery (00246)[19]
	NOC	**Post-Procedure Recovery (2303)**[20] **Indicators:** Patent airway; Spontaneous breathing; Aldrete score; Thermoregulation
	NIC	**Temperature Regulation: Perioperative (3902)**[21] **Training time and level required for execution:** Attending Nurse, more than 1 hour[21] **Postanesthesia Care (2870)**[21] **Training time and level required for execution:** Attending Nurse, 35 minutes[21]
	Prescription	Minimize patient's exposure during surgical preparation and procedure, when possible[21] Monitor vital signs, including central body temperature[21] Verify that the active heating equipment and supplies are in place and in sound operating conditions[21] Ensure adequate body temperature until the patient awakes and regains consciousness[21] Transport the patient using the heating device, as appropriate[21] Monitor oxygenation[21] Monitor surgical site[21] Monitor return of sensitive and motor functions[21] Provide patient's medical record to postoperative care unit[21]

FIGURE 3: Model corresponding to the recording and operationalization of the SPNC based on the patient safety strategies of the third phase (before the patient exits the operating room) from the surgical safety list proposed by the WHO. Rio de Janeiro, Brazil/Porto, Portugal, 2021.

In addition to the NDs used in the elaboration of the SPNC recording and operationalization model for the promotion of patient safety, domain 11 (safety/protection) of the NANDA-I taxonomy includes NDs related to the condition of "free from danger, physical injury or immune system damage; preservation from loss; protection of safety and security"[19:160], which may also be consulted by the nurse to evaluate the patient and outline preventive measures. After identifying the NDs, the NOC and NIC taxonomies can guide the nurse in the implementation and evaluation of the care plan.

It is important to mention that the NIC[21] has a list of estimated professional training time and level required to perform each Nursing intervention described in the taxonomy, also assisting nurses in the adequate staffing of the Nursing team.

It is assumed that the model elaborated presents elements of the Nursing practice (Nursing diagnoses, interventions and outcomes) that are essential to implement an SPNC that promotes patient safety. Nurses may consult the suggested taxonomies to complement their care plan according to each patient's needs. This model may also offer subsidies for implementation projects of computerized systems, being used as the basis for recording the SPNC in electronic charts. Thus, this study may be used in the teaching and learning process of undergraduate Nursing students, in which it can provide clinical reasoning for the implementation of the preventive measures based on the Nursing practice elements.

One of the study limitations was testing the model proposed for the recording and operationalization of the SPNC encouraged for the safety of surgical patients in the empirical field. However, the initial purpose of this research was to present the possibility of integrating the safety strategies of the surgical safety checklist with operationalization of the SPNC using the Nursing taxonomies. This may enable nurses' leading to implement a care plan with actions aimed at promoting the safety of surgical patients in accordance with the patient safety protocols established by the WHO.

CONCLUSION

It was possible to list the main terms contained in the surgical safety checklist proposed by the WHO and to identify the Nursing taxonomies from the NANDA-I, NOC and NIC relations. It is also possible to propose a model that may come to assist nurses in recording and operationalizing the SPNC based on the patient safety strategies. In the model proposed for the SPNC, the NANDA-I, NOC and NIC taxonomies were included, which can assist nurses in clinical reasoning for risk assessment and implementation of preventive measures for patient safety in the perioperative context; in addition to enabling adequate recording of the professional practice and encouraging the safety of surgical patients.

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