

# SYSTEMATIC OR INTEGRATIVE REVIEW

## NURSING DIAGNOSES IN THE PERIOPERATIVE PERIOD OF CARDIAC SURGERY

### DIAGNÓSTICOS DE ENFERMAGEM NO PERIOPERATÓRIO DE CIRURGIA CARDÍACA

### DIAGNÓSTICOS DE ENFERMERÍA EN EL PERÍODO PERIOPERATORIO DE CIRUGÍA CARDIACA

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## ABSTRACT

The identification of nursing diagnoses most commonly reported in the literature in the perioperative period of cardiac surgery can assist nurses in this context of clinical practice to plan the nursing care towards the individual needs of each patient, contributing to the implementation of rapid and effective actions to solve identified problems. An integrative literature review aimed at identifying nursing diagnoses in the perioperative period of cardiac surgery was developed. The search was performed in the LILACS and SCIELO databases with the descriptors "nursing diagnosis", "nursing care", and "cardiac surgery" or "thoracic surgery". Thirteen studies were included, which identified 17 main pre-operative diagnoses, 10 main intraoperative diagnoses, and 28 main post-operative diagnoses. Different studies often found the same diagnosis in each period, which reinforces a profile with which nurses can expect to deal with, and on which they must intervene to obtain the best results. Additional studies on diagnostic accuracy and validity of such diagnoses are expected.

**Keywords:** Thoracic Surgery; Nursing Diagnosis; Intraoperative Period; Preoperative Period; Postoperative Period.

## RESUMO

A identificação dos diagnósticos de enfermagem mais comumente relatados na literatura no perioperatório de cirurgia cardíaca pode auxiliar enfermeiros nesse contexto da prática clínica a planejar cuidados de enfermagem adequados às necessidades individuais de cada paciente, colaborando para a implementação de ações rápidas e eficazes para a resolução dos problemas identificados. Desenvolveu-se uma revisão integrativa de literatura com o objetivo de identificar os diagnósticos de enfermagem no perioperatório de cirurgia cardíaca. A busca aconteceu nas bases de dados LILACS e SCIELO com os descritores "diagnóstico de enfermagem" ou "nursing diagnosis", "cuidados de enfermagem" ou "nursing care" e "cirurgia cardíaca" ou "thoracic surgery". Foram incluídos 13 trabalhos, os quais identificaram 17 principais diagnósticos no pré-operatório, 10 principais diagnósticos no transoperatório e 28 principais diagnósticos no pós-operatório. Diferentes estudos frequentemente encontraram os mesmos diagnósticos em cada período, o que reforça um perfil com o qual os enfermeiros podem esperar lidar e sobre o qual devem intervir para obter melhores resultados. Estudos adicionais sobre a acurácia diagnóstica e a validade de tais diagnósticos são esperados.

**Palavras-chave:** Cirurgia Torácica; Diagnóstico de Enfermagem; Período Intraoperatório; Período Pré-Operatório; Período Pós-Operatório.

## RESUMEN

La identificación de los diagnósticos de enfermería más frecuentes en la literatura sobre el período perioperatorio de cirugía cardíaca puede ayudar a las enfermeras a planificar la atención individual de cada paciente con miras a implementar acciones rápidas y eficaces para resolver los problemas identificados. Con el objetivo de identificar tales diagnósticos se llevó a cabo una revisión integradora de la literatura. La búsqueda se realizó en las bases de datos LILACS y SciELO con las palabras clave: diagnóstico de enfermería o nursing diagnosis, atención de enfermería o nursing care y cirugía torácica o thoracic surgery. Se incluyeron 13 estudios que identificaron 17 diagnósticos principales en el preoperatorio, 10 en el intraoperatorio y 28 en el postoperatorio. Hay distintos estudios que señalan los mismos diagnósticos en cada período. Esto refuerza determinadas situaciones que posiblemente los enfermeros tengan que enfrentar y que tendrán que tener en cuenta para obtener mejores resultados. Sin embargo, son necesarios más estudios sobre la precisión diagnóstica y la validez de tales diagnósticos.

**Palabras clave:** Cirugía Torácica; Diagnóstico de Enfermería; Período Preoperatorio; Período Intraoperatorio; Período Postoperatorio.

## INTRODUCTION

Cardiovascular diseases (CVD) are the main causes of death in Brazil. In 2011, they accounted for 28.6% of 1,170,498 deaths. Ischemic heart disease and heart failure accounted for 39.1% of deaths by CVD. In recent decades, especially in the South and Southeast regions, a decline in mortality from CVD has been observed in Brazil. This same pattern was observed in Europe.<sup>1</sup>

Worldwide, the contribution of CVD to mortality is also significant because one-third of all deaths stems from these diseases in their various forms.<sup>2</sup>

The treatment of cardiac diseases can be clinical or surgical. Both can provide improved quality of life to patients because they improve symptoms and restore heart function, enabling them to return to their normal daily activities. However, when the clinical approach is not enough, the choice should be the surgery. There are three types of cardiac surgery: corrective, in congenital heart defects; reconstructive, involving myocardial revascularization or plasty of the aortic, mitral, and tricuspid valves; and substitute surgeries, with valve replacements and transplants.<sup>3</sup>

Cardiac surgery is a high-risk invasive procedure that requires qualified care by the entire multidisciplinary team. Nurses, in addition to having technical and scientific knowledge, must also know how to deal with possible fears and emotional reactions of the patient who will experience the surgical process, being able to provide peace, security and opportunity to the patient to dialogue and expose their fears.<sup>4</sup>

In this context, nursing must use a work method based on the scientific method, the nursing process (NP).<sup>5</sup> Nursing care provided to patients before, during and after surgery is called perioperative nursing. All NP stages are used for conducting investigations and implementing interventions to promote recovery of health, prevention of other injuries or illnesses and enabling coping with the physical structure and functions.<sup>6</sup>

It is still challenging to abandon thinking based only on procedures, techniques and routines for the transition to the NP, based on which the nurse identifies the health problems, plans, implements actions and evaluate the results.<sup>7</sup>

In the stage of identification of nursing-sensitive human response, i.e. the nursing diagnoses (NDx), the NANDA International Classification (NANDA-I) can be used, with a taxonomy that was developed by nurses by using a variety of research methods aimed at an improved and more consistent planning. Nurses identify the sense of the collected data through a clinical judgment. This judgment is defined as "an interpretation or conclusion on the needs, concerns, or the patient's health problems, and/or the decision to act (or not), use or modify standardized approaches, or improvise new approaches that are considered appropriate for the patient's response."<sup>8</sup>

A previous study investigating scientific productions on perioperative nursing care for cardiac surgery patients points

out that validation and identification of NDx contribute to the technical and scientific development of the profession.<sup>9</sup> The identification of the most commonly reported NDs in the literature on the cardiac surgery perioperative period can assist nurses in this context of clinical practice to plan evidence-based nursing care that is appropriate to the individual needs of each patient, thereby contributing to the implementation of rapid and effective actions to solve identified problems.

Thus, the objective of this study was to identify in the literature the NDx related to the perioperative period of cardiac surgery.

## METHOD

This was an integrative literature review based on the following steps: identification of the problem/research question, definition of inclusion criteria for the literature search, literature search, analysis, and data presentation.<sup>9</sup>

The review was guided by the following question: what are the nursing diagnoses in the perioperative period of cardiac surgery?

The search took place during the month of April of 2014 in the Latin American and Caribbean Health Sciences (LILACS), Bibliographic Database specialized in nursing (BDENF) in Brazil, and Scientific Electronic Library Online (SCIELO) databases. The descriptors used were: *nursing diagnosis*, *nursing care*, and *cardiac surgery* or *thoracic surgery*, combined with the Boolean operator *AND*. The filters used were: articles in Portuguese, English, and Spanish, published from 2003 to 2013. Articles were selected by title and abstract, and those who met the study's objectives were included in the script for recording.

The articles chosen to be part of the study were read in full and their information was extracted using a semi-structured script designed to better-understanding data collection and containing the article's identification data, objective, results, and conclusions. The results were categorized according to the identification period of DEs: pre-, intra-, and post-operative care or as post-operative care.

## RESULTS

A total of 162 studies were retrieved in the databases' search, of which, 22 were duplicates, and 13 were selected for review: two theses, one literature review, and 10 primary studies published in scientific journals.

The studies' identification data are shown in Table 1. These studies were published in Brazil by 2010.

Table 2 highlights the objectives and results of the reviewed studies. Most studies (n = 6) investigated NDx in the postoperative period of cardiac surgery, followed by three re-

search studies on preoperative diagnosis, two studies describing NDx during the three periods, and only one study regarding the intraoperative period.

Table 1 - Distribution of selected articles on nursing diagnoses in the perioperative period of cardiac surgery according to authors, journal/year of publication, title, and database/language

Authors/Year of publication	Journal / Language	Title
Galdeano LA, Rossi LA, Nobre LF, Ignácio DS/ 2003 <sup>11</sup>	Revista Latino-Americana de Enfermagem/ Portuguese	[Nursing diagnosis in the intra-operative period of cardiac surgery]
Carvalho LDP, Araújo TL/2003 <sup>12</sup>	Doctoral dissertation/ Portuguese	[Nursing diagnosis in the peri-operative period of valve surgery]
Galdeano LE, Rossi LA, Pezzuto TM/2004 <sup>5</sup>	Revista Brasileira de Enfermagem / Portuguese	[Nursing diagnoses of patients in the pre-operative period of cardiac surgery]
Bachion MM, Magalhães FGS, Munari DB, Almeida SP, Lima ML, 2004 <sup>13</sup>	Acta Paulista de Enfermagem / Portuguese	[Identification of fear in the preoperative period of heart surgery]
Galdeano LE, Rossi LA, Santos CB, Dantas RAS, 2006 <sup>3</sup>	Revista da Escola de Enfermagem da USP /Portuguese	[Nursing diagnosis in the peri-operative period of cardiac surgery]
Rocha LA, Maia TF, Silva LF, 2006 <sup>3</sup>	Revista Brasileira de Enfermagem / Portuguese	[Nursing diagnosis in patients undergoing cardiac surgery]
Rodrigues CG, Senger R, Guido LA, Linch GFC, 2010 <sup>15</sup>	Revista de Enfermagem da UFPE / Portuguese	[Postoperative complications in cardiac surgery: nursing diagnoses and interventions]
Grasel LH, Bretano EP, Caregnato RC, 2009 <sup>16</sup>	Revista SOBECC /Portuguese	[Anxiety and fear: Nursing diagnoses in the preoperative period of critical patients]
Guerriero ALS, Almeida FA, Guimarães HCQCP, 2009 <sup>17</sup>	Acta Paulista de Enfermagem/ Portuguese	[Children's Nursing diagnoses in the postoperative period of cardiac surgery]
Pivoto FL, Filho WDL, Santos SSC, Almeida MA, Silveira RS/2010 <sup>18</sup>	Acta Paulista de Enfermagem/ Portuguese	[Nursing diagnoses in patients in the postoperative period of cardiac surgeries]
Cruz APO, Lopes R, 2010 <sup>19</sup>	Salusvita/ Portuguese	[Nursing diagnoses in patients in the postoperative period of cardiac surgeries]
Matos SS, 2009 <sup>20</sup>	Doctoral dissertation/ Portuguese	[Nursing diagnoses in patients in the postoperative period of cardiac transplantation and validation of the nursing diagnosis considered most characteristic: spiritual anguish]

Seventeen major NDx were identified pre-operatively, 10 major NDx in the trans-operative period, and 28 major NDx in the post-operative period (Table 3). It was observed that only spiritual anguish was uniquely identified by one single study.

## DISCUSSION

There are several NDx classifications. The most frequently used in Brazil and worldwide is the NANDA International classification.<sup>21</sup> The results of this review highlight this aspect because all identified NDx are part of that classification.

The diagnostic categories related to biopsychosocial needs stood out in the pre-operative period. The NDx related to emotions identified in this review were fear and anxiety.

A descriptive study was conducted in a private hospital specialized in cardiac surgery in Goiânia (GO) where 13 patients were interviewed 24 to 72 hours before surgery. The ND fear was identified in 100% of patients. The related factors consisted of a learned response, innate origin, and separation from significant others in potentially stressful situations. The defining characteristics were: identifies the object of fear/identifies stimuli considered as a threat, decreased self-confidence, apprehension; increased tension, and being scared.<sup>16</sup>

It should be noted that fear differs from anxiety because the individual can identify the cause of the fear, but he is not able to describe the reason for anxiety. A previous study showed that fear of death is spare among the feelings with which patients deal in the pre-operative period of cardiac surgery.<sup>22</sup>

Deficient knowledge in the preoperative period of cardiac surgery was also identified in a previous qualitative research.<sup>22</sup> However, we emphasize that preoperative care performed by nurses can increase anxiety symptoms in patients. These symptoms can be reduced by family welcoming, suggesting that the participation of family members should be stimulated.<sup>23</sup>

Among the NDx related to physiological needs in the preoperative period are: acute pain, ineffective breathing pattern, and activity intolerance. Acute pain in the preoperative phase of cardiac surgery results from the gradual constriction of the coronary arteries, reducing coronary flow. It is commonly triggered by any factor that results in an increased myocardial oxygen demand, such as stress or emotion, and is relieved by rest. Patients describe this feeling as constriction, tightness or burning in the sternal region, often radiating up to the left shoulder, neck, or arm.<sup>5</sup>

The ND activity intolerance is observed in patients with cardiac failure, which can manifest disability to walk, even for a short period, due to respiratory distress, fatigue, and palpitation caused by this activity.<sup>3</sup>

Risk for infection, risk for aspiration, and risk for imbalanced body temperature are highlighted in the transoperative category. The ND risk for infection results from invasive procedures and insufficient primary defense caused by surgical trauma. Several other factors influence the incidence of wound infection, including the pre-operative clinical conditions of the patient (age, nutritional status, chronic diseases, etc.), technical conditions under which the surgery was performed, factors related to the cardiopulmonary circulation, and length of the pre-operative hospital stay.<sup>16</sup>

Table 2 - Distribution of selected studies on nursing diagnoses in the perioperative period of cardiac surgery according to authorship, objectives, and results

Authors	Objectives	Results
Galdeano LE, Rossi LA, Santos CB, Dantas RAS <sup>3</sup>	To identify the NDx in the perioperative period of cardiac surgery and to verify the existence of agreement between the 1 <sup>st</sup> author of the study and other nurses.	NDx with agreement among three nurses: – <b>preoperative:</b> activity intolerance, risk for infection and disturbed sleep pattern; – <b>perioperative:</b> risk for infection, risk for imbalanced fluid volume, risk for aspiration, ineffective protection, impaired skin integrity, risk for peripheral neurovascular dysfunction, risk for perioperative placement lesion, impaired gas exchange, risk for imbalanced body temperature; – <b>immediate postoperative:</b> risk for infection, risk for peripheral neurovascular dysfunction, risk for perioperative positioning injury, impaired physical mobility, risk for aspiration, ineffective protection, impaired skin integrity, sensory/perception changes, impaired verbal communication, ineffective airway clearance and pain.
Galdeano LE, Rossi LA, Pezzuto TM <sup>5</sup>	To identify NDx of patients who in the preoperative period of cardiac surgery.	33 identified NDx, of which nine had a frequency over 50%: risk for activity intolerance, risk for infection, risk for peripheral neurovascular dysfunction, deficient knowledge, risk for decreased cardiac tissue perfusion, ineffective breathing pattern, pain, ineffective sexuality pattern and disturbed sleep pattern. 26 are related to physiological needs, six to psychosocial needs, and one to psycho-spiritual needs. It was also observed that 28 of the NDx are actual and five are of risk.
Galdeano LA, Rossi LA, Nobre LF, Ignácio DS <sup>11</sup>	To identify the NDx of patients in the perioperative period of cardiac surgery.	Of the 11 NDx, eight were identified in all patients: risk for infection, risk for imbalanced fluid volume, impaired gas exchange, risk for aspiration, ineffective protection, impaired skin integrity, risk for peripheral neurovascular dysfunction, risk for positioning perioperative injury and risk for imbalanced body temperature. 90.9% of NDx are related to physiological needs.
Carvalho LDP <sup>12</sup>	To identify nursing diagnoses, their frequency, and statistical significance in 23 adult patients in the peri-operative period of valve surgery.	633 NDx were identified, especially in the physiological needs (63,5%): impaired tissue integrity; impaired spontaneous ventilation; impaired urinary elimination; risk for aspiration; risk for infection; risk for trauma; risk for falls; risk for imbalanced fluid volume; risk for imbalanced body temperature; decreased cardiac output; hypothermia; ineffective breathing pattern; impaired dentition; hypothermia; ineffective airway clearance; imbalanced nutrition: less than body requirements; excess fluid volume; urge urinary incontinence; ineffective protection; ineffective peripheral tissue perfusion; risk for ineffective renal perfusion; impaired physical mobility; disturbed sleep pattern; risk for activity intolerance; fear; pain; anxiety; deficient knowledge; sexual dysfunction; situational low self-esteem; disturbed auditory perception; disturbed visual sensory perception; impaired adaptation; impaired verbal communication.
Bachion MM, Magalhães FGS, Munari DB, Almeida SP, Lima ML <sup>13</sup>	To verify the occurrence of the ND "fear" in people in the preoperative period of cardiac surgery.	The ND "fear" was identified in 100% of clients surveyed. The RF constituted in learned response, innate origin and separation from significant others in potentially stressful situations. The DC presented by most of them were: identifies the object of fear, stimuli considered as a threat, decreased self-confidence, apprehension, increased tension, scared.
Rocha LA, Maia TF, Silva LF <sup>14</sup>	To identify NDx, nursing interventions, and association of outcomes according to NANDA, NIC, and NOC in patients in the postoperative period of myocardial revascularization.	19 NDx were identified, of these, four presented prevalence of 100% and 15 showed frequency > 50%: risk for infection, risk for constipation, toileting self-care deficit, impaired skin integrity, all with the same frequency, impaired physical mobility, impaired tissue integrity, feeding self-care deficit, disturbed sleep pattern, ineffective breathing pattern, anxiety, ineffective airway clearance, acute pain, imbalanced nutrition: less than body requirements, impaired spontaneous ventilation, and risk for activity intolerance.
Rodrigues CG, Senger R, Guido LA, lynch GFC <sup>15</sup>	To perform a survey of studies related to major complications in the postoperative period of cardiac surgery and major identified nursing diagnoses.	According to the diagnoses, only three articles were identified, highlighting the following NDx: risk for infection; risk for aspiration, and impaired skin integrity.
Grasel LH, Bretano EP, Caregnato RC <sup>16</sup>	To know the evidence presented by patients in the pre-operative period of cardiac surgery related to the NDx anxiety and fear defined by NANDA.	There was no decrease in anxiety in the group who attended the meeting compared to the group that did not participate, however, the symptoms related to the diagnosis of fear significantly decreased. Physiological DCs of anxiety: rapid breathing; body aches; pronounced sweating; voice tremor, nausea or vomiting; frequent urination; diarrhea; heat and cold waves; insomnia, loss of appetite; trembling or muscle contractions; palpitations, numbness in the hands or legs; agitation, and dry mouth. Factors related to fear: pain; anesthesia; hospitalization; disabling disease; loss of body function; lack of knowledge about the surgery; surgery and its outcomes.
Guerriero ALS, Almeida FA, Guimarães HCQC <sup>17</sup>	To identify common NDx in children assisted on the first day of the postoperative period of cardiac surgery.	Fifteen NDx were identified as common to most children undergoing cardiac surgery in the postoperative recovery unit, during the 1st post-operative day; six of them were identified as current and nine as of risk: thoracic and lumbar pain; impaired skin integrity; self-neglect: health and nutrition; disturbed sleep pattern; interrupted family processes; impaired physical mobility; risk for imbalanced body temperature; risk for imbalanced fluid volume; decreased cardiac output; ineffective breathing pattern; risk for impaired skin integrity; risk for infection; risk for appetite loss; risk for constipation; risk for unstable blood glucose level.

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Table 2 - Distribution of selected studies on nursing diagnoses in the perioperative period of cardiac surgery according to authorship, objectives, and results

Authors	Objectives	Results
Pivoto FL, Lunardi Filho WD, Santos SSC, Almeida MA, Silveira RS <sup>18</sup>	To identify NDx in the postoperative period of cardiac surgery, with a view to future implementation of the nursing process.	15 identified NDx according to the NANDA International Taxonomy II, 12 actual and the remaining of risk: impaired gas exchange; ineffective airway clearance; impaired verbal communication; impaired bed mobility; impaired skin integrity; hypothermia; hyperthermia; decreased cardiac output; risk for ineffective renal perfusion; acute pain; insomnia; anxiety; risk for infection; risk for imbalanced fluid volume; risk for unstable blood glucose level.
Cruz APO, Lopes R <sup>19</sup>	To identify key NDx in the postoperative period of cardiac surgery in an intensive care unit of a public hospital in the city of Bauru.	24 identified NDx, 15 of them considered as the most common (incidence > 25%): anxiety, impaired verbal communication, self-care deficit (feeding, bathing, dressing, and toileting), acute pain, impaired tissue integrity, impaired bed mobility, risk for aspiration, risk for glycemia, risk for infection, risk for impaired skin integrity, risk of imbalanced fluid volume, fear, decreased cardiac output, ineffective breathing pattern, and nausea. Only two were associated with psychological factors (fear and anxiety).
Matos SS; 2009 <sup>20</sup>	To analyze the profile of NDx in patients in a mediate postoperative period of cardiac transplant in an intensive care unit, according to the taxonomy II of NANDA and validate the most characteristic diagnosis of this clientele.	Sixty NDx were found, however, those with frequency ≥ 40% were only 24: risk for constipation; risk for imbalanced body temperature; risk for infection; risk for spiritual distress; ineffective breathing pattern; impaired gas exchange; impaired spontaneous ventilation; impaired oral mucous membrane; impaired skin integrity; impaired tissue integrity; impaired urinary elimination; fatigue; ineffective protection; impaired physical mobility; impaired bed mobility; imbalanced nutrition: less than body requirements; deficient fluid volume; decreased cardiac output; impaired walking; anxiety; fear; deficient ND activity; spiritual distress. The most characteristic DE was spiritual anguish.

Legend: ND: nursing diagnosis; NDx: nursing diagnoses, DC: defining characteristics, RF: related factors.

Table 3 - Main nursing diagnoses in the preoperative, transoperative, and postoperative periods in cardiac surgery

Period	Nursing diagnoses
Preoperative	1) Activity intolerance <sup>3,5,12</sup>
	2) Risk for peripheral neurovascular dysfunction <sup>3,5</sup>
	3) Risk for infection <sup>3,5</sup>
	4) Ineffective breathing pattern <sup>3,5,12</sup>
	5) Altered cardiopulmonary tissue perfusion <sup>3,5</sup>
	6) Deficient knowledge <sup>3,5,12</sup>
	7) Pain <sup>3,5,12</sup>
	8) Ineffective sexuality patterns <sup>3,5,12</sup>
	9) Disturbed sleep pattern <sup>3,5,12</sup>
	10) Fear <sup>12,13,16</sup>
	11) Anxiety <sup>5,12,16</sup>
	12) Impaired verbal communication <sup>5,12</sup>
	13) Situational low self-esteem <sup>5,12</sup>
	14) Ineffective protection <sup>5,12</sup>
	15) Impaired tissue integrity <sup>5,12</sup>
	16) Constipation <sup>5,12</sup>
	17) Imbalanced nutrition: less than body needs <sup>5,12</sup>
Transoperative	1) Risk for infection <sup>3,11,12</sup>
	2) Risk for imbalanced fluid volume <sup>3,11,12</sup>
	3) Impaired gas exchanges <sup>3,12</sup>
	4) Risk for aspiration <sup>3,11,12</sup>
	5) Ineffective protection <sup>3,12</sup>
	6) Impaired skin integrity <sup>3,12</sup>

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Table 3 - Main nursing diagnoses in the preoperative, transoperative, and postoperative periods in cardiac surgery

Period	Nursing diagnoses
Transoperative	7) Risk for peripheral neurovascular dysfunction <sup>3,12</sup>
	8) Risk for perioperative positioning injury <sup>3,12</sup>
	9) Risk for imbalanced body temperature <sup>3,11,12</sup>
	10) Hypothermia <sup>11,12</sup>
Postoperative	1) Risk for infection <sup>3,12,14,15,16,17,18,19,20</sup>
	2) Impaired skin integrity <sup>3,14,15,17,18,20</sup>
	3) Impaired physical mobility <sup>3,12,14,17,20</sup>
	4) Ineffective airway clearance <sup>3,12,14,18,20</sup>
	5) Acute pain <sup>3,12,14,17,18,19,20</sup>
	6) Impaired gas exchange <sup>3,18,20</sup>
	7) Impaired verbal communication <sup>3,12,18,19</sup>
	8) Risk for imbalanced fluid volume <sup>3,18,19</sup>
	9) Impaired spontaneous ventilation <sup>12,14,20</sup>
	10) Risk for aspiration <sup>3,12,15,19</sup>
	11) Risk for imbalanced body temperature <sup>3,12,17,20</sup>
	12) Decreased cardiac output <sup>12,18,19,20</sup>
	13) Hypothermia <sup>12,18</sup>
	14) Ineffective peripheral tissue perfusion <sup>12,14,18,19</sup>
	15) Deficient fluid volume <sup>3,20</sup>
	16) Bathing/toileting self-care deficit <sup>14,17,19</sup>
	17) Dressing self-care deficit <sup>17,19</sup>
	18) Feeding self-care deficit <sup>14,17,19</sup>

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Table 3 - Main nursing diagnoses in the preoperative, transoperative, and postoperative periods in cardiac surgery

Period	Nursing diagnoses
Postoperative	19) Impaired tissue integrity <sup>12,25</sup>
	20) Risk for constipation <sup>14,17,25</sup>
	21) Disturbed sleep pattern <sup>12,14,17,18</sup>
	22) Ineffective breathing pattern <sup>12,14,19,20</sup>
	23) Anxiety <sup>12,14,18,19,20</sup>
	24) Imbalanced nutrition: less than body requirements <sup>12,14,20</sup>
	25) Risk for unstable blood glucose level <sup>17,18,19</sup>
	26) Ineffective protection <sup>12,20</sup>
	27) Impaired urinary elimination <sup>12,20</sup>
28) Spiritual distress <sup>20</sup>	

According to the NANDA-I definition, the ND risk for imbalanced fluid volume represents the risk of a decrease, increase or rapid shift from one to the other of intravascular, interstitial, and/or intracellular fluid. This refers to body fluid loss, gain, or both.<sup>8</sup> A study revealed that invasive procedures are cited as a risk factor for the diagnosis. These procedures can bring outcomes that are expected in cardiac surgery, such as electrolyte disturbances and fluid overload due to surgical stress and anesthesia, which increase the antidiuretic hormone. Inadequate volume replacement may also result in hypovolemia or fluid deflection into the interstitial space.<sup>24</sup>

Risk for aspiration in patients undergoing general anesthesia is related to the depression of laryngeal reflexes. Although tracheal intubation for ventilation is a method of protecting the airways in these patients, microaspiration can still occur.<sup>25</sup>

The ND risk for imbalanced body temperature in the transoperative period is represented by the constant oscillation of temperature during cardiac surgery. However, such fluctuations occur by induction. At the beginning of surgery, the patient is usually hypothermic due to the prolonged exposure to the low temperature in the operating room; anesthetic agents, which prevent the body to react to the reduction of body temperature by muscle contraction that is able to produce heat; infusion of fluids at low temperature; action of potent vasodilators; and induced hypothermia in the cardiopulmonary circulation. At the end of the cardiopulmonary circulation, the patient is warmed up gradually with the use of thermic mattresses.<sup>3,11</sup>

In the postoperative period, the NDx impaired skin integrity; impaired physical mobility, acute pain, ineffective airway clearance, and spiritual anguish are highlighted.

The ND impaired skin integrity is a specification in the alteration of tissue integrity, defined as the state in which the individual's skin suffers adverse changes in the level of dermis and

epidermis. The surgical intervention requires several processes leading to impaired integrity of the skin such as need for central venous access; median sternal or lateral surgical incision; insertion of drains; and artery puncture.<sup>17</sup>

The ND impaired physical mobility defined as a "Limitation in independent, purposeful physical movement of the body or of one or more extremities",<sup>21</sup> can be related to bed restraint due to the surgical procedure, drains that restrict body movements, and feeling pain when moving. The defining characteristics include the restriction imposed on movement due to surgical trauma and drains, and impaired ability to turn sideways<sup>18,24</sup>.

Acute pain in the cardiac surgery postoperative phase occurs in the incisions, invasive procedures, drains and retraction of the sternum. Monitoring complaints of pain, providing analgesia before the pain is intense and monitoring the effectiveness of analgesia are activities to be performed by the nursing staff to avoid hypertensive peaks and tachycardia induced by intense pain.<sup>26</sup>

According to the NANDA taxonomy, ineffective airway clearance diagnosis is defined as "inability to clean secretions or obstructions from the respiratory tract to maintain a clean airway" and belongs to domain 11 (safety/protection) and class 2 (physical lesion)<sup>8</sup>. In the postoperative cardiac surgery, the related factor of this ND is the artificial airway. One of the post-anesthetic recovery expectation is that this related factor is eliminated in the immediate postoperative period.<sup>24,25</sup>

The ND spiritual anguish was the most common for patients in the immediate postoperative period of a heart transplant and is validated by specialist nurses. However, the authors emphasize the difficulties of nurses to identify this ND due to a training that is deficient in communication that allows expression of feelings and needs by the patient.<sup>20</sup>

Knowing the disease, the context in which it occurs and using clinical reasoning are essential aspects for nurses to be able to recognize the NDx. In the postoperative period of cardiac surgery, recognition of the NDx and the pathophysiological processes allow for the planning and implementation of individualized and qualified interventions.<sup>18</sup>

## FINAL CONSIDERATIONS

This integrative literature review investigated the main nursing diagnoses identified in the pre-, trans- and postoperative periods in cardiac surgery. Different studies have often found the same diagnoses in each period, which reinforces a profile with which nurses can expect to deal with and on which they must intervene to obtain the best results. Additional studies about the diagnostic accuracy and validity of such diagnoses are expected.

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