

# An Analysis of Nursing Diagnoses for Patients Undergoing Procedures in a Brazilian Interventional Radiology Suite

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## ABSTRACT

Innovations in minimally invasive surgery have led to more procedures being performed in the interventional radiology suite. It, therefore, is essential that nurses in radiology departments be competent to care for all types of patients. Use of nursing classification systems can improve care by providing standardized language for documentation. We conducted a project that involved 25 patients undergoing interventional radiology procedures between August and October 2006 in São Paulo, Brazil, to identify the most frequent North American Nursing Diagnosis Association (NANDA) nursing diagnoses used and then compared the NANDA diagnoses to Perioperative Nursing Data Set diagnoses. The most frequent nursing diagnoses in the participants were anxiety, chronic pain, inefficient tissue perfusion—peripheral, deficient knowledge, and risk for falls. These results are similar to diagnoses that have been reported in outpatient centers. The NANDA and Perioperative Nursing Data Set diagnoses were found to be similar. *AORN J* 91 (May 2010) 544-557. © AORN, Inc, 2010. doi: 10.1016/j.aorn.2009.09.032

*Key words:* North American Nursing Diagnosis Association, NANDA, Perioperative Nursing Data Set, PNDS, nursing diagnoses, interventional radiology, minimally invasive surgery, perioperative nursing care.

The care provided in radiology services is diverse, in part because of innovations in minimally invasive surgery. The use of robotics and microengineered instruments has led to more procedures being performed in the interventional radiology (IR) suite<sup>1</sup>; thus, nurses face the challenges of applying the nursing process to patient care in radiology. Nurses practicing in IR must be competent to care for all types of pa-

tients, from those having elective procedures to patients who are critically ill and require emergent procedures. These nurses need critical thinking skills to prevent or identify and intervene in problems that affect the safety of patients, and they must be skilled in interpersonal communication and counseling.<sup>2</sup> It is essential to introduce the nursing process to nurses in IR, particularly nursing diagnoses, to better organize the nursing

care provided to patients in this environment. Nursing process models and philosophies all begin with patient assessments that guide nursing care; the nursing process includes data collection, diagnoses, and the planning and assessment of the care that is given.<sup>3</sup>

In Brazil, specifically at the hospitals located in São Paulo, nurses are just beginning to introduce the use of North American Nursing Diagnosis Association (NANDA) nursing diagnoses into practice. To identify the most frequently used NANDA diagnoses in patients undergoing IR procedures, we interviewed 25 patients at an interventional vascular radiology unit at a government tertiary teaching hospital in the southeast region of São Paulo, Brazil, between August and October 2006. We also sought to describe the factors (ie, defining characteristics) related to the nursing diagnoses and compare the NANDA diagnoses to those of the Perioperative Nursing Data Set (PNDS).

### HISTORY OF NURSING DIAGNOSIS CLASSIFICATIONS

In the 1990s, the NANDA classification of nursing diagnoses was organized into nine categories called Human Response Patterns (ie, Taxonomy I).<sup>3</sup> In 2001, after several assessments, NANDA published Taxonomy II, designed from changes in the structure of Health Functional Patterns proposed by Gordon.<sup>4</sup> In 2008, the NANDA classifications were organized into 13 domains with 187 nursing diagnoses.<sup>5</sup> A domain represents an activity, study, or interest that reflects the content of its diagnoses.<sup>6</sup> Each nursing diagnosis presents, in addition to a definition, the characteristics and related factors to guide the nurse's diagnosis choice.<sup>7</sup> For example, the nursing diagnosis of "impaired memory" includes defining characteris-

tics such as the inability to recall factual information, the inability to learn or retain new skills or information, and forgetting to perform a behavior at a scheduled time, and related factors, such as fluid and electrolyte imbalance, neurological disturbances, and decreased cardiac output.

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**Nurses in the interventional radiology suite must have critical thinking skills to prevent or identify and intervene in problems that affect the safety of patients, and they must be skilled in interpersonal communication and counseling.**

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In recognizing that certain nursing diagnoses and interventions were relevant to all phases of perioperative care, in 1993, AORN began to develop a set of data elements to describe perioperative

nursing practice.<sup>8</sup> In 2000, after the American Nurses Association recognized the utility of the data set for perioperative nursing practice, AORN published the *Perioperative Nursing Data Set*.<sup>8</sup> The PNDS is a standardized nursing vocabulary that can be used to describe perioperative nursing practice from preadmission until discharge. Use of this data set allows nursing care to be systematically quantified, coded, and easily recorded in a computerized format in perioperative settings.

The original conceptual framework for the PNDS had three patient care domains: Safety, Physiologic Responses, and Patient and Family Behavioral Responses. Each of the patient care domains had nursing diagnoses, interventions, and outcomes specific to that domain. Health systems is the fourth domain that completes the model and represents "the structural data elements that exist in the perioperative environment or health system."<sup>8(p22)</sup> This was added in the second edition, published in 2002.<sup>9</sup>

In the 2007 revised second edition of the *Perioperative Nursing Data Set*, the PNDS statements in the Behavioral Domain were subdivided with explanatory domain extension A: Knowledge about the perioperative process and B: Patient rights and ethics.<sup>10</sup> The PNDS now comprises 28 outcomes, 75 nursing diagnoses, and 153 nursing interventions that are useful in describing surgical

patients' preadmission preparation, preoperative assessment, intraoperative nursing care, postoperative recovery, discharge teaching, and at-home postoperative convalescence.<sup>10</sup>

Literature about the application of PNDS nursing diagnoses outside of the United States is scarce. We found few Brazilian or foreign articles on health and nursing databases that identified nursing diagnoses that could be used to guide nursing care in radiology services. Currently, in hospitals in São Paulo, Brazil, nurses are beginning to introduce the use of NANDA nursing diagnoses into practice. For this reason, we began our investigation with the NANDA classification system of nursing diagnoses and then correlated them to the PNDS. We administered a questionnaire in the IR department of a facility in São Paulo, where nurses use a standardized instrument to collect data but do not use standardized language for nursing diagnoses. The goals of our investigation were to

- identify the most frequent NANDA nursing diagnoses of patients in an IR service,
- describe the factors (ie, defining characteristics) related to the nursing diagnoses, and
- compare the NANDA nursing diagnoses with those in the PNDS.

## METHODS

This project was performed in an interventional vascular radiology unit at a government tertiary teaching hospital in the southeast region of São Paulo, Brazil. Most patients at this hospital have chronic diseases and are treated in the ambulatory care setting of the hospital. The patient interviews were conducted after we received approval by the ethical research committee of the University of São Paulo Nursing School.

### Sample and Measures

A convenience sample of 25 adult patients undergoing minimally invasive procedures was established. This number represents 30% of the total number of patients undergoing neurological or vascular interventional procedures monthly. Inclu-

sion criteria were that the patient had to be awake; alert; oriented to person, place, and time; and interested in participating in the project.

We adapted a questionnaire developed by Brazilian experts in the field of nursing diagnoses (Figure 1).<sup>11</sup> The questionnaire has three parts to identify patients by sociodemographic characteristics, clinical data, and assessment of comorbidities, according to the domains of NANDA classification Taxonomy II.<sup>5</sup>

### Procedures

Data collection occurred from August to October 2006. We approached potential participants in the reception area of the unit while the patients waited for their procedures and informed them about the purpose of the survey. If they had time before the procedure and were interested in participating, then the patients gave their written consent. After admission to the unit and completion of unit admission measures, the investigator interviewed each patient in a private area before his or her procedure and completed the questionnaire. Each interview lasted approximately 20 minutes. No additional follow up was performed with the patients. Nursing intervention outcomes were not evaluated because the purpose of the study was only to identify the nursing diagnoses present on admission to the IR department.

### Data Analysis

Data from the completed questionnaires were reviewed and interpreted by the investigator based on the defining characteristics of nursing diagnoses and the related factors described by NANDA, and nursing diagnoses were assigned. The project supervisor and a nursing diagnosis expert also independently reviewed the completed questionnaires and assigned nursing diagnoses. Nursing diagnoses assigned by the investigator and the reviewers then were compared, and the questionnaires were reanalyzed to obtain a consensus about diagnoses in the event there was disagreement among the evaluators. Nursing diagnoses were presented by NANDA domains

and the related factors or defining characteristics. The NANDA nursing diagnoses and domains also were compared with those of the PNDS.

## RESULTS

The age range of the patients in the study was 23 to 84 years, and 84% (n = 21) were between 40 and 84 years of age. Most of the participants were men (64%, n = 16); 36% (n = 9) were women. The majority (56%, n = 14) had incomplete elementary education (ie, grades 1 through 6); 60% (n = 15) lived in São Paulo; 68% (n = 17) were undergoing their procedures for the first time; and all patients were cared for by the *Sistema Único de Saúde*, the Brazilian government health care system. The most common comorbid conditions were hypertension (52%, n = 13) and diabetes (36%, n = 9). A majority of the participants (68%, n = 17) were outpatients and most of them (88%, n = 22) were being treated in the specialty outpatient clinics of the hospital.

Nearly one-third of the participants (32%, n = 8) were older adults (ie, age 60 years old and older). Of the participants,

- 36% (n = 9) presented with circulatory system diseases,
- 12% (n = 3) had neurological disorders,
- 12% (n = 3) had neoplasms,
- 8% (n = 2) had digestive diseases, and
- 32% (n = 8) had disorders in other body systems.

The interventional radiologists performed arteriography on 14 of the patients (56%). They followed the examination with angioplasty or embolization in six of the 14 patients (43%).

Most of the patients needed anesthesia to undergo the procedure:

- 80% (n = 20) received local anesthesia,
- 8% (n = 2) received spinal anesthesia,
- 4% (n = 1) received epidural anesthesia,
- 4% (n = 1) received general anesthesia, and
- 4% (n = 1) did not receive any anesthesia.

In addition, 20% of patients (n = 5) needed to be sedated.

We identified 25 NANDA nursing diagnoses (Table 1) used during the perioperative period that corresponded to 21 PNDS diagnoses (Table 2). The number of older patients may have influenced the high number of nursing diagnoses identified. The most frequently used NANDA and PNDS diagnoses were anxiety, chronic pain, deficient knowledge, and risk for falls. The most frequent NANDA domains were Safety/Protection, Activity and Rest, Coping/Stress Tolerance, Comfort, and Perception and Cognition.

### Safety/Protection

The NANDA diagnosis “risk for falls” (n = 7) was the most frequent nursing diagnosis in the Safety/Protection domain. The defining characteristics or risk factors for the nursing diagnosis “risk for falls” were patients who

- were 65 years of age or older,
- were physically impaired,
- were wheelchair bound,
- were gait impaired,
- were hearing or vision impaired,
- were diagnosed with neoplasms,
- were experiencing faintness or neuropathy, or
- required anticonvulsant agents.

The second most frequent nursing diagnosis in the Safety/Protection domain was “risk for infection” (n = 4). Patients at increased risk for infection included those with renal failure, cholangitis, invasive devices in place (eg, drains and catheters), and skin lesions.

The diagnosis “impaired skin integrity” (n = 2) was seen in patients who presented with first- and second-degree burns or with bruises that were present on admission and unrelated to the patients’ IR procedures. The nursing diagnosis “impaired tissue integrity” (n = 3) was related to damaged or destroyed tissue. This diagnosis relates to many patients without obvious skin breakdown or damage (ie, a burn) and older adult patients with impaired circulation. Other patients at risk would include those receiving general anesthesia because of their inability to move during

### Data Collection Questionnaire

**Demographic data**  
 Name: \_\_\_\_\_ Hospital registration number: \_\_\_\_\_  
 Gender: \_\_\_\_\_ Age: \_\_\_\_\_  
 Level of schooling: \_\_\_\_\_

**Clinical data**  
 Medical diagnosis: \_\_\_\_\_  
 Procedure request date: \_\_\_\_\_  
 Procedure scheduling date: \_\_\_\_\_  
 Nursing consultation date: \_\_\_\_\_  
 Proposed exam/procedure: \_\_\_\_\_  
 Is the first time that you have undergone this procedure? ( ) yes ( ) no  
 Type of procedure: ( ) inpatient ( ) outpatient  
 Where do you receive follow up care? \_\_\_\_\_

**Patient assessment for NANDA nursing diagnoses domains**

**Knowledge of disease**  
 What is your health problem? \_\_\_\_\_  
 What do you know about the planned procedure and the preparation for it? \_\_\_\_\_  
 Do you take medicine? ( ) yes ( ) no  
 If yes, please specify what medication you take: \_\_\_\_\_  
 Do you take the medicine(s) regularly? ( ) yes ( ) no  
 If not, why not? \_\_\_\_\_  
 Are you addicted to any medication or substance? ( ) yes ( ) no  
 If yes, please identify the substance ( ) alcohol ( ) tobacco ( ) illicit drugs

**Familiar relationship**  
 With whom do you live? \_\_\_\_\_  
 Are you satisfied with your care? ( ) yes ( ) no  
 If not, why not? \_\_\_\_\_  
 Observed impressions of patient-caregiver interaction during the interview. \_\_\_\_\_

**Spirituality/religiosity**  
 Do you have a religion? ( ) yes ( ) no  
 If yes, specify: \_\_\_\_\_  
 Are there spiritual things that you consider important? ( ) yes ( ) no  
 If yes, specify: \_\_\_\_\_  
 Do they help you to face the pain, the disease, or other obstacles in your life? ( ) yes ( ) no  
 If yes, specify how: \_\_\_\_\_

**Anxiety/fear**  
 Are you nervous now? ( ) yes ( ) no  
 If yes, specify why: \_\_\_\_\_  
 Are you afraid of something? ( ) yes ( ) no  
 If yes, specify what: \_\_\_\_\_  
 Does the patient display the presence of any of the following signs?  
 ( ) nausea ( ) sweating ( ) pallor ( ) palpitations  
 ( ) trembling ( ) chest pain or tightness ( ) shortness of breath ( ) dry mouth

**Mobility**  
 Classify the following statement as: I do by myself, I need help, I am dependent  
 Eating: \_\_\_\_\_  
 Bathing: \_\_\_\_\_  
 Dressing: \_\_\_\_\_  
 Walking: \_\_\_\_\_  
 What is your level of physical activity? \_\_\_\_\_  
 Do you have some physical disability? ( ) yes ( ) no  
 If yes, specify what it is: \_\_\_\_\_

Figure 1. The questionnaire used to identify the most commonly used nursing diagnoses at an interventional radiology suite in São Paulo, Brazil. The questionnaire was adapted from Cruz DALM, Pimenta CA. Evaluation of patients with chronic pain in nursing consultations: proposal of an instrument for nursing diagnosis [in Portuguese]. *Rev Lat Am Enfermagem*. 1999;7(3):49-62.

**Nutrition/elimination**  
 Appetite ( ) regular ( ) diminished  
 How many meals do you eat a day? \_\_\_\_\_  
 Do you have a special diet? \_\_\_\_\_  
 How many glasses of water do you drink a day? \_\_\_\_\_  
 Do you often feel thirsty? \_\_\_\_\_  
 Weight \_\_\_\_\_ Height \_\_\_\_\_  
 Skin turgor \_\_\_\_\_  
 Frequency of urinary elimination during the day \_\_\_\_\_  
 Urine color \_\_\_\_\_  
 Urinary symptoms: ( ) urinary urgency ( ) urinary incontinence ( ) urine retention  
 ( ) urinary pain ( ) blood in urine ( ) urinary frequency

**Cardiovascular/pulmonary responses**  
 Blood pressure \_\_\_\_\_  
 Pulse rate (rhythm, amplitude, frequency) \_\_\_\_\_  
 Peripheral perfusion \_\_\_\_\_  
 Edema ( ) yes ( ) no  
 If yes, location \_\_\_\_\_  
 Cardiac problems ( ) yes ( ) no  
 If yes, specify what type: \_\_\_\_\_  
 Breathing rate \_\_\_\_\_  
 ( ) cough ( ) secretions ( ) dyspnea  
 Other signs and symptoms: \_\_\_\_\_

**Safety/protection**  
 Have you undergone surgical procedures recently? ( ) yes ( ) no  
 If yes, specify: \_\_\_\_\_  
 Had you experienced any trauma? \_\_\_\_\_  
 ( ) venous access ( ) surgical drain ( ) skin lesions  
 ( ) itching ( ) clammy skin ( ) use of topical remedies  
 Temperature \_\_\_\_\_

**Comfort**  
 Do you feel pain frequently? ( ) yes ( ) no  
 If yes, specify where \_\_\_\_\_  
 What influences the pain? \_\_\_\_\_  
 ( ) is continuous ( ) comes and goes  
 ( ) sudden onset ( ) insidious onset  
 What relieves the pain? \_\_\_\_\_  
 What worsens the pain? \_\_\_\_\_  
 Are you feeling pain now? ( ) yes ( ) no  
 Intensity of the pain where 0 equals no pain, 10 equals the worst imaginable pain: \_\_\_\_\_

**Expression**  
 Facial expression and gesture  
 ( ) Appears to be suffering/pain ( ) crying ( ) appears sad  
 ( ) uncooperative ( ) appears to be protecting a body area ( ) maintains eye contact  
 ( ) restless ( ) appears tranquil

**Literacy**  
 Can the patient  
 Read? ( ) yes ( ) no  
 Write? ( ) yes ( ) no  
 Speak? ( ) yes ( ) no  
 Patient shows ability to understand important details ( ) yes ( ) no  
 Patient can express ideas clearly ( ) yes ( ) no  
 Patient shows signs of sensory perception deficit ( ) yes ( ) no  
 If yes, specify what type \_\_\_\_\_

Figure 1. (continued).

**TABLE 1. Distribution of Patients According to NANDA Domains and Nursing Diagnoses<sup>1</sup>**

Domain	NANDA diagnosis	n
Safety/Protection	Risk for falls	7
	Risk for infection	4
	Impaired tissue integrity	3
	Ineffective protection	3
	Impaired skin integrity	2
Activity and Rest	Ineffective tissue perfusion	9
	Impaired physical mobility	4
	Impaired walking	2
	Deficiency in self-care	1
Coping/Stress Tolerance	Anxiety	10
	Fear	5
	Compromised family coping	1
Comfort	Chronic pain	9
	Acute pain	6
Perception and Cognition	Deficient knowledge	7
	Disturbed sensory perception	2
	Impaired memory	2
	Acute confusion	1
Elimination/Exchange	Impaired urinary elimination	3
	Urge urinary incontinence	1
Nutrition	Risk for deficient fluid volume	3
Health Promotion	Ineffective family therapeutic regimen management	1
	Ineffective health maintenance	1
Role Relationships	Interrupted family processes	1
Life Principles	Risk for spiritual distress	1

1. North American Nursing Diagnosis Association. *Nursing Diagnoses: Definitions and Classifications [in Portuguese]*. Porto Alegre, Rio Grande do Sul, Brazil: Artes Medicas; 2008.

the procedure and any patient involved in a procedure lasting longer than two hours. We did not address the above-mentioned risks in our project because the procedures usually last less than two hours and very few patients undergo general anesthesia. We chose only to address obvious skin damage present before the start of the procedure that would increase the need for nursing care. Patients with skin breakdown or damage were also at increased “risk of infection” because of impaired skin integrity. The use of antineoplastic

medications, clotting alterations, and invasive procedures justified the diagnosis of “ineffective protection” in three patients.

**Activity and Rest**

The main nursing diagnosis in the domain Activity and Rest was “ineffective tissue perfusion” (n = 9), which is defined as the “decrease in oxygenation, leading to inability to nourish capillary tissues.”<sup>5(p229)</sup> It was found in patients with peripheral (n = 7), neurological (n = 1), and gastrointestinal (n = 1) disorders. Peripheral disorders, in particular, circulatory system diseases, were the most frequent conditions noted. Ineffective peripheral tissue perfusion was characterized by factors such as edema, skin discoloration, absent or weak pulse, changes in motor response, and abdominal distension and tenderness.

The nursing diagnosis “impaired physical mobility” (n = 4) was present in patients with neurological disorders, which limited their ability to perform gross or fine motor skills, and in patients with neuromuscular impairment, limited range of motion, discomfort, pain, or slowed movement. In one patient, a 69-year-old woman with ischemic stroke, hypertension, and diabetes, the disease was so advanced that she received the diagnosis of “self-care deficit,” which NANDA defines as the inability to handle utensils, to get to a toilet, and to carry out proper toilet hygiene, and neuromuscular impairment.<sup>5(p41-44)</sup> Two patients undergoing screening for vascular disease made verbal reports of pain and received the nursing diagnosis “impaired walking,” characterized by environmental constraints, such as a lack of assistive devices or care.

**Coping/Stress Tolerance**

The nursing diagnosis “anxiety” (n = 10) in the domain of Coping/Stress Tolerance was especially related to patients who expressed concern, were restless, or displayed organic alterations (eg, physical symptoms such as trembling, urinary urgency, alterations in the voice) because of the scheduled procedure. We observed that patients experienced

**TABLE 2. Distribution of Patients According to NANDA Nursing Diagnoses and PNDS Classification and Domains**

NANDA nursing diagnoses (domain) <sup>1</sup>	n	PNDS nursing diagnoses (domain) <sup>2</sup>
Anxiety (C/S)	10	Anxiety (B)
Ineffective tissue perfusion (A/R)	9	Ineffective tissue perfusion (P)
Chronic pain (C)	9	Chronic pain (P)
Risk for falls (S/P)	7	Risk for falls (S)
Deficient knowledge (P/C)	7	Deficient knowledge (B)
Acute pain (C)	6	Acute pain (P)
Fear (C/S)	5	Fear (B)
Risk for infection (S/P)	4	Risk for infection (S)
Impaired physical mobility (A/R)	4	Impaired physical mobility (S)
Impaired tissue integrity (S/P)	3	Impaired tissue integrity (S)
Ineffective protection (S/P)	3	Ineffective protection (S)
Impaired urinary elimination (EE)	3	Impaired urinary elimination (P)
Risk for deficient fluid volume (N)	3	Risk for deficient fluid volume (P)
Impaired skin integrity (S/P)	2	Impaired skin integrity (S)
Impaired walking (A/R)	2	
Disturbed sensory perception (P/C)	2	Disturbed sensory perception (S)
Impaired memory (P/C)	2	Disturbed thought processes (B)
Interrupted family processes (RR)	1	Interrupted family processes (B)
Deficiency in self-care (A/R)	1	
Compromised family coping (C/S)	1	Compromised family coping (B)
Acute confusion (P/C)	1	
Urge urinary incontinence (EE)	1	
Ineffective family therapeutic regimen management (HP)	1	Ineffective therapeutic regimen management (B)
Ineffective health maintenance (HP)	1	Ineffective health maintenance (B)
Risk for spiritual distress (LP)	1	Spiritual distress (B)

*NANDA = North American Nursing Diagnosis Association, PNDS = Perioperative Nursing Data Set, C/S = Coping/Stress Tolerance, B = Behavior Responses, A/R = Activity/Rest, P = Physiologic Responses, C = Comfort, S/P = Safety/Protection, EE = Elimination/Exchange, N = Nutrition, RR = Role Relationships, HP = Health Promotion, LP = Life Principles.*

1. North American Nursing Diagnosis Association. *Nursing Diagnoses: Definitions and Classifications [in Portuguese]*. Porto Alegre, Rio Grande do Sul, Brazil: Artes Medicas; 2008.

2. Petersen C, ed. *Perioperative Nursing Data Set. Rev 2nd ed.* Denver, CO: AORN, Inc; 2007.

more anxiety when those waiting with them (eg, relatives) left the holding area. The holding area was a common area for preoperative and postoperative patients, which may have added to the anxiety for preoperative patients because some patients are sedated after the procedure and others complain of pain and of being separated from their family members until discharge.

Some patients also showed physiological alterations, such as increased respiration, blood pressure, heart rate, and nausea, in response to anxiety. The nursing diagnosis “fear” (n = 5) was characterized by factors similar to those generated by anxiety, such

as physiological alterations and patients’ abilities to identify the feeling of fear and the reason for it.

**Comfort**

The diagnosis “chronic pain” (n = 9) was the most frequent nursing diagnosis in the Comfort domain. Chronic pain is defined as an “unpleasant sensory and emotional experience due to real or potential tissue lesion or described in terms of this lesion; with a sudden or slow onset, with mild to severe intensity, constant or recurrent, with no expected or predicted end and lasting over six months.”<sup>5(p112)</sup> Its incidence was higher in our project than “acute

pain” (n = 6) because of the patients’ age and the presence of chronic diseases.<sup>5</sup> All patients presenting with chronic pain reported that the intensity of their pain had increased with time until it impaired their ability to perform some activities. Their chronic pain was the main reason they reported searching for the medical care that led to their IR procedure. Most patients presenting with acute pain said they could control it with medications and rest, especially when the pain was associated with their lower limbs, and they were currently under medical treatment for it. The defining characteristics that enabled us to make these two nursing diagnoses were verbal report, protective gestures, and fear of a new lesion, and for chronic pain, specifically, physical inability.

### Perception and Cognition

The diagnosis of “deficient knowledge” (n = 7) in the Perception and Cognition domain is defined as the “absence or deficit of cognitive information related to a specific topic.”<sup>5(p68)</sup> This diagnosis was identified in seven patients who presented with anxiety or fear. The IR outpatients that we interviewed presented with different levels of knowledge about their procedures. They received counseling when they scheduled their procedures and from the nursing staff members on the day of the examination. This difference in knowledge may be related to participants’ education levels, as well as the inability of staff members to provide adequate instructions before the patients’ arrival to the IR department. In Brazil, it is common for patients to not understand health information and medical language or to not have the ability to read and write, and not express their lack of understanding.

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The patients that we interviewed presented with different levels of knowledge about their procedures. In Brazil, it is common for patients to not understand health information and medical language or to not have the ability to read and write, and not express their lack of understanding. Staff members may not be able to provide adequate instructions because they do not consider the patient’s level of education when they give them preparatory information.

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Staff members may not be able to provide adequate instructions because they do not consider the patient’s level of education when they give them preparatory information.

### Other Domains

Two additional nursing diagnoses that are important for preprocedure nursing assessment in IR include

“risk for deficient fluid volume” in the Nutrition domain and “impaired urinary elimination” in the Elimination/Exchange domain. “Risk for deficient fluid volume” is caused by factors such as type of medication, abnormal fluid loss, and need for fluid intake; “impaired urinary elimination” is character-

ized by dysuria, nocturia, and urinary retention. These diagnoses are important because of the frequent use of IV contrast agents in IR procedures.

Nursing diagnosis identification in the Psychosocial domain, such as “compromised family coping,” “ineffective family therapeutic regimen management,” and “interrupted family processes,” is important in planning interventions for the postoperative period to avoid complications such as bleeding at the site of the catheter insertion. Because of their ages, levels of education, and diagnoses (eg, impaired memory, acute confusion, deficiency in self-care, deficient knowledge), patients need a family member or caregiver to help them follow staff member instructions related to the site of the catheter insertion. The nursing diagnoses “risk for spiritual distress,” “ineffective health maintenance,” “acute confusion,” “impaired memory,” “disturbed sensory perception,” and “stress urinary incontinence” presented with low frequency in our investigation.

**TABLE 3. Distribution of Patients According to PNDS Domains and Nursing Diagnoses<sup>1</sup>**

Domain	PNDS diagnosis	n
Safety	Risk for falls	7
	Risk for infection	4
	Impaired tissue integrity	3
	Ineffective protection	3
	Impaired skin integrity	2
	Impaired physical mobility	6
Physiologic responses	Ineffective tissue perfusion	9
	Chronic pain	9
	Acute pain	6
	Disturbed sensory perception	2
	Impaired urinary elimination	4
	Risk for deficient fluid volume	3
Behavioral responses	Anxiety	10
	Fear	5
	Compromised family coping	1
	Deficient knowledge	7
	Disturbed thought process	3
	Ineffective health maintenance	2
	Ineffective therapeutic regimen management	1
	Interrupted family processes	1
	Spiritual distress	1

PNDS = Perioperative Nursing Data Set.  
 1. Petersen C, ed. *Perioperative Nursing Data Set. Rev 2nd ed.* Denver, CO: AORN, Inc; 2007.

**DISCUSSION**

When applying the nomenclature of the PNDS to determine the nursing diagnoses in our project, we observed 21 nursing diagnoses very similar to NANDA nursing diagnoses. All nursing diagnoses from NANDA were present in the list of diagnoses of the PNDS, except “acute confusion” and “impaired memory,” which could correspond to the PNDS diagnosis “disturbed thought process,” and “deficiency in self-care,” which was classified as “ineffective health maintenance” (Table 3).

The principle NANDA diagnosis identified in our project was “anxiety.” Anxiety was related to a lack of knowledge about how to prepare for the examination, as reported by admitted patients, as well as a lack of explanation about the procedure

itself. This lack of preparation led patients to experience feelings of insecurity and fear. Physiologically, excessive anxiety stimulates the patient’s sympathetic nervous system and can lead to an increase in catecholamine secretion and cause an increase in heart rate and contractility as well as blood pressure.<sup>12</sup> These effects can increase the frequency of possible adverse reactions to surgery or functional disturbances related to the use of iodized contrast media.<sup>12</sup>

Anxiety and fear are manifestations that can be overlapped. It is common to be afraid of new situations. In conventional surgery, patients may try to overcome their fears by seeking information from relatives or friends who have undergone the same procedure. In IR procedures, however, there is a smaller likelihood of finding individuals who have been in the same situation. It is the nurse’s responsibility to provide as much information as the patient needs to allay his or her anxieties and fears before surgery and to correct misinformation the patient may have received from friends or family members.

It is important to evaluate signs and symptoms of pain before the procedure. The performance of IR examinations or procedures usually requires the patient to maintain a still, supine position. A patient with pain tends to change position to relieve his or her symptoms. This need to change position may affect the performance of the procedure or hinder the interventional radiologist’s ability to thread the catheter to the site of the intervention. The administration of sedatives during the perioperative period must be based on a strong pharmacological knowledge to ensure the patient’s safety and allow follow-up of any possible complications.<sup>13</sup> Education programs for the health care team about nonpharmacological therapies, such as therapeutic communication, relaxation, directed imagination, or self-hypnosis, as well as the use of music helped the nursing staff contribute to a decrease in pain reported by patients undergoing IR procedures and a tendency for these patients to reduce their medication use.<sup>14,15</sup>

The diagnosis “deficient knowledge” is still very important in Brazil because of the level of education of people who use the governmental health care services. Researchers identified the diagnosis “deficient knowledge” in patients with heart disease during the preoperative evaluation on the surgical unit.<sup>16</sup> Most of these patients verbalized a lack of knowledge regarding preoperative preparation, the procedure itself, and about the referral and the day it was performed.

A retrospective study of oncology patients undergoing surgery also identified the nursing diagnosis “deficient knowledge” and “pain” in some patients, but these diagnoses occurred less frequently during subsequently scheduled procedures, which suggests that patients’ preparation and their conditions are related to the occurrence of these nursing diagnoses.<sup>17</sup> A study developed to evaluate patients undergoing gastrointestinal procedures in an IR department looked at the effect of patient education by specialist nurses. The researchers showed that these nurses contributed to improving patients’ knowledge and obtaining consent for the procedure before the examination day; however, there was no significant change in anxiety levels after patient education.<sup>18</sup>

Diagnoses related to fluid balance and renal function are also relevant to patients undergoing IR procedures. Proper hydration may reduce the deleterious effects of contrast agents, especially those related to nephrotoxicity. Dehydration is one of the main risk factors that determine adverse reactions during IR procedures. Likewise, adequate renal function is essential for the excretion of contrast agents. The faster these agents are excreted by the body, the faster adverse effects such as anticoagulation will disappear.<sup>19</sup>

“Risk for spiritual distress,” “ineffective health maintenance,” “acute confusion,” “impaired memory,” “disturbed sensory perception,” and “stress urinary incontinence” were considered important diagnoses because they could influence the proper preparation of the patient, the attendance of the patient on the specified day, and his or her com-

fort and safety during the procedure. The nursing diagnosis “risk for spiritual distress” in the Functional domain also was observed in a study that involved patients undergoing angioplasty, in which the researchers noted other nursing diagnoses, including risk for cardiac output decrease, risk of lesion caused by infiltration of contrast media, risk of impaired tissue perfusion: peripheral and cerebral, fear, anxiety, acute pain, and risk for infection.<sup>20</sup>

The most frequently observed nursing diagnoses in our project have also been identified in several studies. In one study of patients undergoing conventional ambulatory surgeries,<sup>21</sup> researchers found anxiety and fear of pain, surgery, and anesthesia to be the main psychosocial diagnoses of the patients. Researchers who used an instrument based on Levine’s theory to assess adult patients undergoing surgery in outpatient facilities identified 14 nursing diagnoses, and three were identified in the preoperative period: anxiety, impaired physical mobility, and altered health maintenance.<sup>22</sup> During the operative period, six nursing diagnoses were found: risk for infection, anxiety, risk for aspiration, risk for altered respiratory function, risk for lesions from perioperative positioning, and risk for trauma. In the postoperative period, five nursing diagnoses were observed: risk for acute pain, anxiety, altered health maintenance, risk for lesions, and altered urinary elimination.<sup>22</sup>

In a preoperative analysis of patients undergoing cardiovascular surgeries in a hospital in São Paulo, Brazil, researchers observed the presence of the following nursing diagnoses: fear, anxiety, knowledge deficit, risk for infection, risk for decreased cardiac output, activity intolerance, risk for deficient fluid volume, risk for altered nutrition, risk for altered tissue perfusion, risk for altered sexuality, risk for impaired physical mobility, risk for impaired skin integrity, and risk for spiritual distress.<sup>23</sup>

Assessment of patients for our project occurred only in the preoperative period, but, according to the IR literature, we may assume that the following

nursing diagnoses are frequent in this population during the intraoperative period:

- impaired tissue integrity—referring to the artery puncture to introduce the catheter;
- risk for infection—from the invasive procedure, tissue trauma, and increased environmental exposure;
- risk for deficient fluid volume—bleeding from the introduction and withdrawing of the catheter; and
- risk for ineffective tissue perfusion—risks for ischemia from thrombi, spasms, and embolizing agents.

The nursing diagnosis “ineffective protection” applies to patients who undergo antineoplastic therapy and those using corticosteroids, immunosuppressive medications, anticoagulants, and thrombolytic therapy and those with blood clotting changes. For patients receiving general anesthesia, we can add the risk for aspiration and ineffective respiratory pattern, because general anesthesia may significantly alter breathing patterns, vital signs, and protective reflexes.

The similarities in nursing diagnoses in different settings demonstrates the need

for a perioperative nursing assessment and diagnosis to act as a framework for patient care and education related to the procedure. Preoperative nursing assessment and diagnosis can help ensure adequate preoperative preparation of patients and provide an opportunity to minimize anxiety, reduce the risk of surgical complications, and prepare the patient for the postoperative period and recovery.

The domains in the PNDS classification (ie, Safety, Physiologic Responses, Behavioral Responses, Health System) are different from those

of NANDA but similar to those (ie, Safety, Physiological, Behavioral, Family, Health System, and Community) adopted by the group that created the nursing interventions classifications (ie, NIC),<sup>24</sup> a standardized language used to describe specific behaviors during delivery of nursing treatments. The NANDA and PNDS nursing diagnoses in our project are similar. Differences in domains and nomenclature do not compromise the use of the interventions and outcomes described in the PNDS for patients who undergo IR procedures. The limitations of this project are the inclusion of only a small number of patients because there was insufficient time for extra nursing documentation and interviewing of the patients on the day of the procedure.

## CONCLUSION

The five most frequent nursing diagnoses in the project sample were anxiety, chronic pain, deficient knowledge, inefficient tissue perfusion—peripheral, and risk for falls. People with a tendency for anxiety could be identified in appointments before the procedure day and be helped by nursing interventions, thus reducing the risk of stress-related complications. Educating patients and their family members about the procedures and using nursing interventions for pain control or relief contribute to the well-being of the patient during and after the procedure. The risk of falls increases with a patient’s advanced age and compromised mobility. Most IR procedures are performed under local anesthesia, and patients remain awake. To prevent complications and because of the risk of contaminating the sterile field, the patients cannot move during the procedure. For this reason,

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**Preoperative nursing assessment and diagnosis can help ensure adequate preoperative preparation of patients and provide an opportunity to minimize anxiety, reduce the risk of surgical complications, and prepare the patient for the postoperative period and recovery.**

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patients may require special attention from the nurse to ensure their safety. During the postoperative assessment of patient complications, information about peripheral tissue perfusion is important to distinguish signs of damage to skin integrity related to the procedure from pre-existing conditions.

Although data were obtained from a limited sample of patients, the outcomes of this study show the complexity of the current and potential health care needs of patients undergoing minimally invasive procedures in IR, and their similarities with patients undergoing surgery in outpatient facilities. Because of the severity of the diseases, there is a need to establish a nursing process based on technical, scientific knowledge; educate and empower nurses; and construct and validate instruments to identify nursing diagnoses in all clinical situations. Interventional radiology procedures require a sterile field; patient positioning; and use of endovascular medical devices, anesthetic medications, and imaging equipment that can compromise the safety of the patient. Patient situations in IR are similar to those seen in the OR, and this project provides support for nurses to apply the diagnoses, interventions, and outcomes described in the PNDS to care for patients in the IR department.

Comparing NANDA and PNDS nursing diagnoses shows that it is possible to keep using NANDA nursing diagnoses in the preoperative evaluation of patients when following the guidelines of the hospital and to use interventions and outcomes proposed in the PNDS. The use of nursing classifications systems is important because these systems introduce standardized language for documentation of nursing care and allow reflection about nursing practice and quality of care provided. Nursing scientific knowledge in the IR field is progressing, and studies are needed to identify and

standardize the use of the nursing process in these units. **AORN**

**Editor's note:** *At the time this article was being considered for publication in the AORN Journal, the Perioperative Nursing Data Set, 3rd ed, was in press. The contents of this article are based on the Perioperative Nursing Data Set, Rev 2nd ed.*

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