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Standardized nursing languages in orthopedics from the perspective of the nursing role effectiveness model

Linguagens padronizadas de enfermagem em ortopedia na perspectiva do nursing roleeffectiveness model

Lenguajes estandarizados de enfermería en ortopedia desde la perspectiva del nursing role effectiveness model

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ABSTRACT

Objective: To analyze the standardized nursing languages in orthopedics from the perspective of the Nursing Role Effectiveness Model.
Method: Mixed method research carried out in a hospital in southern Brazil between April 2016 and February 2017. Quantitative data were collected from 85 orthopedic patients using the NANDA-International, Nursing Interventions and Outcomes, and submitted to statistical analysis. Qualitative data were collected through interviews with 10 nurses and were analyzed using content analysis.
Results: Acute pain (96%) was a prevalent nursing diagnosis. Fall Prevention (33.3%) was the most prescribed intervention. Pain Level, Body Positioning: self-initiated and Mobility showed an increase in outcome scores ($p<0.001$). In the interviews, nurses indicated that priority diagnoses and nursing interventions contributed to improving mobility outcomes.
Conclusion: The findings revealed that the focus of Standardized Nursing Languages in orthopedics from the perspective of the Nursing Role Effectiveness Model lies in the context of mobility, but it needs improvements in diagnostic accuracy and electronic health record.
Keywords: Nursing process. Nursing diagnosis. Orthopedic nursing.

RESUMO

Objetivo: Analisar as Linguagens padronizadas de enfermagem em ortopedia na perspectiva do Nursing Role Effectiveness Model.
Método: Pesquisa com método misto realizado em um hospital do Sul do Brasil entre abril de 2016 a fevereiro de 2017. Os dados quantitativos foram coletados de 85 pacientes ortopédicos usando a NANDA-International, Classificação de Intervenções e Resultados de enfermagem, submetidos à análise estatística. Os dados qualitativos foram coletados por meio de entrevistas com 10 enfermeiros e foram analisadas mediante análise de conteúdo.
Resultados: Dor aguda (96%) foi diagnóstico de enfermagem prevalente. Prevenção de quedas (33,3%) foi a intervenção mais prescrita. Nível de Dor, Posicionamento do Corpo: autoiniciado e Mobilidade apresentaram aumento nos escores de resultado ($p<0,001$). Nas entrevistas os enfermeiros apontaram que os diagnósticos prioritários e as intervenções de enfermagem contribuíram para a melhoria dos resultados de mobilidade.
Conclusão: Os resultados revelaram que o foco das Linguagens padronizadas de enfermagem em ortopedia na perspectiva do Nursing Role Effectiveness Model reside no contexto da mobilidade, porém precisa de melhorias na acurácia diagnóstica e registro no prontuário do paciente.
Palavras-chave: Processo de enfermagem. Diagnóstico de enfermagem. Enfermagem ortopédica.

RESUMEN

Objetivo: Analizar las lenguajes de enfermería en ortopedia desde la perspectiva del Nursing Role Effectiveness Model.
Método: Estudio de método mixto realizado en un hospital del sur de Brasil entre abril de 2016 y febrero de 2017. Los datos cuantitativos fueron 85 pacientes ortopédicos por médio de NANDA International, Clasificación de Intervenciones y Resultados de Enfermería com análisis de datos mediante estadística. Los datos cualitativos se recogieron a través de entrevistas con 10 enfermeras y se analizaron mediante análisis de contenido.
Resultados: Dolor agudo (96%) fue el diagnóstico de enfermería prevalente. Prevención de caídas (33,3%) fue la intervención más prescrita. Nivel de dolor, Posición del cuerpo: autoiniciado y Movilidad mostraronaumento en las puntuaciones de los resultados ($p<0,001$). En las entrevistas, las enfermeras indicaron que los diagnósticos prioritarios y las intervencione contribuyeron a mejorar los resultados de movilidad.
Conclusión: Los datos revelaron que el enfoque de los Lenguajes Estandarizados de Enfermería en ortopedia según la perspectiva del Nursing Role Effectiveness Model se encuentra en el contexto de la movilidad, pero necesita mejoras en la precisión diagnóstica y el registro electrónico de salud.
Palabras clave: Proceso de enfermería. Diagnóstico de enfermería. Enfermería ortopédica.

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INTRODUCTION

The debate about standardized nursing languages is not new. Researchers have been working since 1970 to clarify nursing phenomena in classification systems, and the most currently used systems are International NANDA[1] (NANDA-I, for nursing diagnoses), Nursing Interventions Classification (NIC)[2] and Nursing Outcomes Classification (NOC)[3]. These describe evaluations, interventions and outcomes in the Nursing Process (NP) [1–3]. However, it is essential to analyze the different aspects involved in the use of these languages for a comprehensive understanding of these phenomena in clinical nursing practice.

The Nursing Role Effectiveness Model (NREM)[4] is a perspective that may favor this analysis. The NREM is based on both Donabedian's structure-process-outcome model, which focuses on quality of care, and a comprehensive review of the literature on nursing-sensitive patient outcomes and the effectiveness of the nursing role in acute care[4]. Compared to the Donabedian model, the NREM incorporates specific nursing components, allowing for the conceptualization of nursing's contribution to patient outcomes in a multidimensional health care environment[4].

The Structure component consists of patient, nurse and organizational characteristics that influence care processes and outcomes. Patient characteristics may include, for example, demographics, age, gender, education, type and severity of illness, and comorbidities, among others. As for the characteristics related to the environment, variables such as personnel allocation, environment and workload can be investigated. Regarding nurses, the NREM suggests the analysis of data related to training, experience and the set of skills[4].

Regarding the Process, the characteristics focus exclusively on nursing interventions grouped into three roles: independent, dependent and interdependent[4]. The independent role includes interventions initiated autonomously by nurses in the nursing diagnosis, such as screening, facilitation of self-care, exercise enhancement, and pain management, for example. The dependent role is characterized by interventions that are part of the scope of nursing practice, initiated by nurses in health care. This involves the implementation and coordination of care, such as assessing patients' response to medical treatment. The interdependent role consists of activities performed by nurses in association with other health professionals[4].

The Outcome component consists of nursing-sensitive patient outcomes. The NREM suggests six different categories to be investigated: prevention of adverse events, such as injuries or nosocomial infections; clinical outcomes, including symptom control and management; patient knowledge about the disease, its associated treatments and management; functional health outcomes, including physical, social, cognitive and mental status and self-care skills; patient satisfaction and costs[4].

Scoping review that attempted to identify the use of NREM in clinical practice analyzed 22 articles. Most studies were conducted in Canada (n=12) and the United States (n=6), and few studies were conducted in other countries (e.g. Singapore, Portugal). The scenarios comprised acute care (n=13); long stay (n=1), home care (n=1), outpatient care (n=2), primary care (n=2) and unspecific care for a single scenario (n=4). These studies used the NREM for guiding the selection of variables and there was variability regarding each component of the NREM. Only a few studies examined the relationships between variables in the model components (structure, process and outcome), with two studies using NIC (process) and one using NOC (outcome)[4]. The specifics of the scope of nursing practice, such as care for patients undergoing total hip arthroplasty (THA) are elements to be analyzed from the NREM perspective, with emphasis on the influence of standardized nursing languages on orthopedic patient outcomes. These patients have mobility and positioning limitations, restricted bed mobility, pain, risk for prosthetic dislocation and falls; thus, it is essential to implement nursing interventions that favor safe care and free of complications arising from the surgery.

It is known that NANDA-I, NIC and NOC and the NREM are topics widely discussed in the international scenario[1–7]; However, no Brazilian studies with a unified approach were found[4]. The relevance of this study lies in the contributions of nursing, through the use of standardized languages in the nursing process, for patients undergoing THA, supporting the definition of more effective care. Therefore, attention to NANDA-I, NIC and NOC (diagnoses, interventions and outcomes) and adoption of NREM principles (structure, process and outcome) in orthopedic patients is justified. The following question was then proposed: How do the standardized nursing languages implemented in the clinical practice of orthopedic patients relate to the NREM perspective?

Thus, the present study aimed to analyze the standardized nursing languages in orthopedics from the perspective of the Nursing Role Effectiveness Model.

METHODS

Mixed-methods research guided by sequential transformative strategy, which consists of a two-phase design. The sequential transformative strategy uses a theoretical lens that overlaps sequencing procedures; and combination of data occurs by connection, as in the other sequential strategies. The Nursing Role Effectiveness Model provided the theoretical perspective for integration in the analysis/discussion of the outcomes[8]. The first phase involved a quantitative approach (QUAN) and the second, a qualitative approach (QUAL). The capital letters indicate the phase prioritized - in this case, both phases had approximately equal priority - and the arrow indicates that the phases were carried out sequentially (QUAN → QUAL). The presentation of the outcomes was done separately (sections) and integrated at the level of interpretation through joint display presentation.

The study setting was a university hospital in southern Brazil, accredited by the Joint Commission International, in the postoperative inpatient unit. In addition to the different specialties, this unit allocated beds for patients undergoing THA, whose focus is on multidisciplinary treatment for pain relief, restoration of joint function and symptom control after surgery. Also, patients undergo one physical therapy session per day and other procedures are performed by a properly trained nursing team. This program aims to improve patient outcomes in order to facilitate hospital discharge.

In that hospital, the NP is included in the patients' medical records. Clinical reasoning for nursing diagnosis is based on NANDA-I and Wanda Horta's Theory, while nursing prescription is based on the NIC. The NOC is not included in the institution's computerized system, but is being considered for implementation soon. Data was collected from April 2016 to February 2017.

Quantitative phase

In the QUAN phase, the following inclusion criteria were established: patients over 18 years of age, undergoing THA and admitted to the hospital for at least four days. Patients with postoperative complications such as nausea, vomiting or severe pain; transferred to other institutions or units and/or with limitations that made communication and interaction with researchers difficult were excluded from the study. Sample size calculation was performed with the use of WinPepi v.11.65. (Computer programs for epidemiologists). Considering a significance level of 5%, a power of 80%, and a coefficient of determination (R^2) of 0.15[4], a minimum number of 85 patients followed up in the study was obtained.

The Structure variables evaluated considered the patients' characteristics collected from the electronic medical records. Nursing diagnoses Acute Pain, Risk for falls and Impaired Physical Mobility (NANDA-I) were selected for investigation. It should be noted that in the health facility where the study was conducted there is a list of nursing diagnoses that can be selected by nurses based on clinical reasoning. The researchers did not influence this decision. Moreover, other variables such as years of schooling, presence of a caregiver during hospitalization, walking to the bathroom, types of bed and availability of a private toilet were included. Process variables considered the nursing care inserted in the institution's computerized system, which can be selected by nurses according to the established nursing diagnosis, classified in this study as independent, according to the NREM. To evaluate the Outcome variables, NOC Body Positioning results: self-initiated, Mobility and Pain level were used, which were collected directly from patients, at the bedside.

Collection of QUAN data was performed after the presentation of the Free and Informed Consent Form (FICT) to the patients who met the inclusion criteria. In the first evaluation, the researchers collected structure variables, and NOC outcomes were collected 12 hours after surgery, according to a five-point Likert scale (1 = worst to 5 = best score), based on previously elaborated conceptual and operational definitions.

Scores were obtained at the end of each assessment, and these measures were reapplied in subsequent assessments (2nd, 3rd and 4th days), with an interval of 24 hours. Total score was calculated by adding the score of each evaluated result. The rate of nursing prescriptions (process) was also monitored daily, and its frequency was subsequently calculated. Control of prescribing nurses was also recorded to select the sample group for the qualitative phase. These data were organized by the researchers using Microsoft Office Excel 2010, on a computer of the research project.

Statistical analysis was performed using the Statistical Package for the Social Science (SPSS), version 21.0. Continuous variables were described as mean and standard deviation, or median and interquartile ranges for those with non-normal distribution. Categorical variables were described as absolute numbers and relative frequencies. To compare the means of NOC outcomes, the Generalized Estimating Equations (GEE) model was used. Bonferroni's *post hoc* test was performed to obtain the differences between follow-up days. Paired t-test was used to compare the scores of the indicators on the first and last day of assessment. To assess the internal consistency of the NOC scales, Cronbach's Alpha was used. A $p<0.05$ was considered statistically significant.

Qualitative phase

In the QUAL phase, the study population consisted of 75 nurses who worked in the postoperative inpatient unit during the period of data collection. Only nurses who prescribed care to patients in the QUANT sample (patients undergoing total hip arthroplasty), who had been working at the health institution for at least one year, used the NP, and who had at least one year of experience with orthopedic patients were included. Nurses away from their care functions or on vacation were excluded. Based on these criteria, the Randomize List program was used to randomly select eligible nurses, with the intention of including at least one subject from each unit that allocated orthopedic patients, and from all shifts, totaling 10 nurses, disregarding data saturation criteria.

Online invitation letters were sent to the institutional e-mails of the subjects, informing the objective of the research, and priority was given to the days, places and times of preference of the participants, not to interfere with their work routines. After the subjects expressed their willingness to participate in the study, convenient time and place for data collection were scheduled. No nurse refused the invitation to participate in the study. Prior to each interview, the TCLE was signed in two copies: one for the respondent and another for the researcher, with the information contained therein being explained, as well as the benefits of participating in the research. Individual interviews were carried out through the administration of an instrument containing data on demographic characteristics: age, gender, educational level and length of professional experience, as well as questions related to knowledge about standardized nursing languages NANDA-I, NIC and NOC and about the perceptions and experiences in the nursing process of patients undergoing THA, namely: "How do you perceive the use of NANDA-I, NIC and NOC classifications in clinical practice?""What signs and symptoms do you consider to establish priority nursing diagnoses in patients undergoing THA?""How do you make your decision on nursing care for these patients?", "How do you assess whether the diagnosis has improved, worsened or stabilized or whether it should be excluded for this profile of patients?". It should be noted that the data collection instrument was tested in a pilot study with two nurses, whose data were not included in the final sample.

Data were collected by the researcher, with the support of a qualified Scientific Initiation fellow, whose statements were recorded on a digital recorder (cell phone recorder program installed on Smartphone) with the consent of the respondents for later transcription and data analysis. There was no interruption during data collection. Interviews lasted on average 20 minutes.

The researchers analyzed the interviews based on attentive active listening and transcription of the interviews in a Microsoft Office Word 2010 document, according to the logical sequence of the questions asked, with double checking of the respondents' statements. Qualitative data analysis was performed by thematic content analysis proposed by Bardin, in three stages, as follows: (1) pre-analysis, with floating reading to know the content of the empirical material generated by the transcription of the interviews; (2) material exploration, when raw data is transformed into units that represent meanings and then aggregated into categories; (3) treatment and interpretation of the results[9].

The inferences were grouped, and themes and content similarities were identified regarding the NREM perspective. In the presentation of the findings, the respondents' statements followed the chronological order of the interviews. No software was used in the qualitative analysis of the data obtained.

The project was approved by the research ethics committee (protocol No 16-0118) with a Certificate of Presentation of Ethical Assessment (CAAE) 50981015.9.0000.5327, according to the Resolution of the National Health Council No. 466/2012. All participants signed the informed consent form. For the presentation of the findings of the qualitative stage, the respondents' statements were identified with letter N (nurses), followed by the interview number (N1, N2, N3…).

RESULTS

Findings of phase 1 –quantitative data

In the QUAN phase, 92 patients undergoing THA were evaluated. Of these patients, three refused to participate in the study and three were excluded for other reasons (severe pain, presence of neurological sequelae and/or disorientation). Only one patient was discharged and was not included in the final analysis. Of the total number of patients, 58 (68.2%) were followed up for four days, and the others for three days.

Structure: patient characteristics and nursing diagnoses NANDA-I

In Structure, the sample consisted predominantly of female patients (n = 44; 58%), with a mean age of 64 years (± 13.5). The main surgical indication was osteoarthrosis (n = 61; 86%). Seventy-seven patients (90%) had caregivers during hospitalization. Regarding education, the mean was 10.3 (± 5.9) years of schooling. Eighty-four (99%) patients were in an orthopedic bed with Balkan frame and trapeze and 42 (49%) had a private toilet. Sixty (70%) of the patients reported walking to the bathroom. The prevalent nursing diagnosis was Acute pain 82 (96%), followed by Risk for falls 53 (62%) and Impaired Physical Mobility 46 (54%).

Process: nursing interventions prescribed according to NIC

In the Process variables, the Fall prevention intervention (33.3%) was the most prescribed, followed by Pain control (27%) and Positioning (17%). Some interventions were identified in more than one diagnosis, for example, Positioning, found in all of them.

A total of 108 nursing care were identified in the nursing prescriptions, and all were prescribed at least once a day. For Acute pain, Record pain as the fifth vital sign (77%) and Administer analgesia after evaluation (60%) were the most observed; Regarding Risk for Falls, the most frequent precautions were Keeping bed in the lowest position (68%) and Implementing fall prevention measures (66%); Teaching the proper use of crutches, walker, cane, prosthesis (46%), followed by Checking vital signs (43%) were the most frequent care measures for patients with impaired physical mobility. It should be noted that some care measures were prescribed for more than one diagnosis, such as checking vital signs, which was present in all of them. The number of nursing prescriptions decreased during the follow-up, as shown in Chart 1.

Results: evolution of NOC nursing outcome scores

In the Outcome variables, there was a significant increase in all NOC nursing outcome scores in the comparison of the means obtained on the first and fourth day of follow-up ($p < 0.001$), as shown in Table 1.

Mean Pain Level improved compared to the first and last assessments, from 3.33 ± 0.12 on the first day to 4.71 ± 0.09 on the last day. In the outcomes Body Positioning: Self-initiated and Mobility there was an increase of about two points during the follow-up (Table 1). All Cronbach Alpha scores were above 0.7.

Findings of phase 2 – qualitative data

In the QUAL phase there were 10 prescribing nurses for the patients included in the QUAN phase. Regarding the characterization of the participants, nine were women aged between 29 and 39 years. Regarding the level of education, the maximum degree was considered: Five participants had master's degrees and four were specialists. The length of professional experience with orthopedic patients ranged from four to 15 years.

As for the empirical material, the responses were identified and sorted according to content analysis, which led to three categories related to the NREM: Structure: Diagnostic reasoning process - establishing the priority nursing diagnoses; Process: Care planning - decision making for nursing care; and Outcome: Evolution of nursing outcomes - evaluation of the effectiveness of nursing care, as shown in Chart 2.

NIC Interventions for Acute Pain	Nursing care	Rateof Nursing prescriptions			
		1st Day n=82	2ndDay n=82	3rd Day n=82	4th Day n=58
Pain Control	Recording pain as the fifth vital sign	62 (76)	63 (77)	63 (77)	45 (78)
	Administering analgesia after evaluation	49 (60)	49 (60)	48 (58)	37 (65)
	Evaluating the characteristic, location and intensity of pain using a verbal categorical scale	37 (45)	41 (50)	37 (45)	37 (65)
	Communicating pain signals	29 (35)	29 (35)	29 (35)	21 (37)
	Reassessing pain 30 minutes to 1 hour after management	25 (30)	26 (32)	26 (32)	20 (35)
	Reportingdisorders during infusion of analgesics	25 (30)	24 (29)	24 (29)	15 (26)
	Assessing pain intensity	20 (24)	20 (24)	19 (23)	11 (19)
	Implementing cryotherapy care	15 (18)	15 (18)	15 (18)	13 (16)
Vital signs monitoring	Checking vital signs	20 (24)	20 (24)	20 (24)	13 (23)
Positioning	Maintaining proper position for the procedure	17 (21)	17 (21)	17 (21)	13 (23)
NIC interventions for Risk for Falls	**Nursing care**	**Rate of Nursing Prescriptions**			
		1st Day n=(53)	2nd Day n=(53)	3rd Day n=(53)	4th Day n=(39)
(6490) Fall prevention	Keeping bed in the lowest position	36 (68)	35 (66)	34 (64)	26 (67)
	Implementing fall prevention measures	33 (62)	33 (62)	35 (66)	27 (69)
	Making sure bed wheels are locked	34 (64)	33 (62)	34 (64)	28 (72)
	Implementing care according to the fall assistance protocol	32 (60)	31 (58)	32 (60)	25 (64)

Chart 1 – Rate of nursing prescriptions for patients with Acute Pain, Risk for Falls and Impaired Physical Mobility undergoing Total hip arthroplasty. Porto Alegre, Rio Grande do Sul, Brazil.

(0840) Positioning	Keeping the bell withinreach of patients	32 (60)	31 (58)	31 (58)	23 (59)
	Using full-length bed side rail	32 (60)	31 (58)	31 (58)	24 (61)
	Keeping patients'belongings nearby	30 (57)	29 (55)	29 (55)	22 (56)
	Monitoringuse of wristbands on patients classified in fall risks	23 (43)	22 (41)	22 (41)	18 (46)
	Teaching the proper use of crutches, walker, cane, prosthesis	15 (28)	15 (28)	15 (28)	10 (26)
	Assisting patients inambulation	10 (19)	10 (19)	10 (19)	8 (20)
NIC interventions for Impaired Physical Mobility	**Nursing Care**	**Rate of Nursing Prescriptions**			
		1st Day n=46	**2nd Day n=46**	**3rd Day n=46**	**4th Day n=30**
(0221) Teaching: prescribed activity/exercises.	Teachingthe proper use of crutches, walker, cane, prosthesis	21 (46)	20 (43)	19 (41)	14 (47)
(6680) Vital signs monitoring	Checking vital signs	20 (43)	20 (43)	20 (43)	15 (50)
(0840) Positioning	Using bed with Balkan frame and trapeze	19 (41)	17 (40)	17 (40)	12 (40)
	Keeping the bell within reach of patients	16 (35)	15 (33)	14 (30)	12 (40)
	Keeping patients' belongings nearby	10 (22)	10 (22)	9 (20)	8 (27)
(3540) Prevention of pressure ulcers (3520) Care for pressure ulcers	Implementing care protocol for the prevention and treatment of pressure ulcers	11 (24)	12 (26)	13 (28)	11 (37)
(3590) Skin supervision	Inspecting skin in search for hyperemic or ischemic spots	11 (24)	11 (24)	10 (22)	7 (23)
(6490) Fall prevention	Using full-length bed side rail	10 (22)	10 (22)	10 (22)	9 (30)
(0221) Exercise therapy: ambulation	Assisting patients in ambulation	10 (22)	9 (19)	7 (15)	5 (23)
(1801)Self-care assistance: bathing/hygiene	Assisting patients in the shower	9 (19)	8 (17)	8 (17)	7 (23)

Chart 1 – Cont.
Source: Research data.
n (%).

Table 1 – Mean of the scores obtained for the nursing outcomes of patients submitted to total hip arthroplasty. Porto Alegre, Rio Grande do Sul, Brazil.

Nursing outcomes	1st Day (n=85)	2nd Day (n=85)	3rd Day (n=85)	4th Day (n=58)	P
Pain Level	3.33 (± 0.12)[a]	4.04 (± 0.11)[b]	4.52 (± 0.08)[c]	4.71 (± 0.09)[c]	<0.001
Body positioning: Self-initiated	2.15 (± 0.13)[a]	3.85 (± 0.12)[b]	4.49 (± 0.09)[c]	4.66 (± 0.10)[c]	<0.001
Mobility	2.05 (± 0.11)[a]	3.51 (± 0.12)[b]	4.25 (± 0.10)[c]	4.53 (± 0.10)[d]	<0.001

Source: Research data.
*Generalized estimating equations (GEE). Data expressed as mean ± standard error.
[a,b,c,d]Equal letters do not differ by the Bonferroni Test.

According to the NREM, regarding structure, the content of the analysis of the data obtained in the interviews with the nurses begins with aspects related to patients, their clinical conditions, data that provide evidence for the choice of priority nursing diagnoses. In the category Diagnostic reasoning process: by establishing priority nursing diagnoses, nurses expressed the signs and symptoms that make up the nursing diagnoses most used by patients, such as Acute Pain, Risk for Falls and Impaired Physical Mobility. These nursing diagnoses are essential for the preparation of care planning for patients undergoing THA. Nurses make an effort to justify the choice of these diagnoses as priorities in the context of mobility, describing the steps of diagnostic reasoning. Among the opinions, the value attributed by nurses to the assessment of pain and risk of falls, with focus on mobilization and safe positioning, deserves mention.

As for nursing care, the nurses reported that they implement an individualized care plan for patients undergoing THA, as described in the second category Care planning: decision-making for nursing care, in the Process dimension of the NREM. Clinical evidence is related to the need for nursing interventions, with prescription based on daily clinical assessment. According to the testimonies, the interventions are focused on mobilization and positioning, responding to the nursing diagnoses listed. Asked about how they make decisions on nursing care, the participants Nurses' statements about decision-making in nursing care show the importance of orthopedic care and the focus on nursing outcomes.

Regarding the Outcome dimension, of the NREM, the category Evolution of nursing outcomes: evaluation of the effectiveness of nursing care appears in the qualitative findings. In the field of study, nurses use judgment terms such as "maintained", "improved", "worsened" or "excluded" when they evaluate the evolution of a nursing diagnosis. The excerpts in Chart 2 demonstrate that nurses assess the effectiveness of nursing care based on the mitigation of pain that results in patient walking autonomy and concern with mobility safety. Thus, the nursing process performed for these patients is completed. The way these outcomes are verified is characteristic of the institution investigated, based on the Primary Nursing model, which focuses on integral and sequential care, and ensures that prescribed care is continuous and its assessment from patient admission to discharge. This model facilitates the implementation of NANDA, NIC and NOC in clinical practice, since according to the characteristics reported by nurses, the quality of assistance and the effects of care must be measured with less subjectivity, and integrated into the assessments that are already carried out.

Integration of results

In this study, integration of results is presented through a joint display in Chart 2, according to the dimensions of the NREM Structure – Process – Outcome. This approach favors a visual representation of the understanding and integration of the results of quantitative and qualitative findings, enabling the generation of meta-inferences. During the study, a decision was made to connect the data, by relating differences and similarities, to obtain a more in-depth analysis. It was hoped, therefore, that the joint display would provide a greater understanding of the factors that demonstrate the relationship between NREM dimensions.

In Chart 2, the left side shows quantitative data related to NANDA-I, NIC and NOC, arising from data collection of patients undergoing THA. The right side presents qualitative data derived from the interviews with nurses, which illustrate the participants' perception regarding these areas.

NREM	Quantitative results	Qualitative results
Structure	Acute pain (96%); Risk for falls (62%); Impaired Physical Mobility (54%).	*The main characteristic is the pain in the immediate postoperative period, as this surgery causes a lot of suffering. Impaired physical mobility, because I want the patients to leave the hospital walking. Therefore, this diagnosis has to be the priority (N1).* *First, It is necessary to check for pain and mobility, which is somewhat restricted to the bed. Then, gait training with the walker begins. Therefore, I will have to check the risk of falling, that is, whether the patient can fall or not (N5).* *Significant mobility restriction, movement limitation, many patients are bedridden, impaired mobility both in bed and out of it. Patients need help to get out of bed, go to the bathroom, make changes in position, to make all the movements. At first, I assess mobility, because it implies the risk for falling. (N8)*
Process	Fall prevention (33.3%); Pain control (27%); Positioning (17%).	*I won't prescribe a bunch of usual routine care. It should be noted that patients will need care because of the pain, as they do not feel pain only in the surgical wound, they feel pain because of the restriction of movement, of surgical positioning. It is important to identify the CALOI (characteristic, location and intensity). For mobility reasons, patients should be encouraged to leave the bed, as soon as this is allowed by the protocol. On the second day, patients can sit down (N1).* *I know pain management, I know how to position patients in bed, keep the lower limbs abducted, apart, a side cushion must be used (N4).* *If I listed Risk for falls, I'm supposed to place a bracelet on the patient's wrist and monitor him/her, not let this patient get out of bed alone, ring the bell, keep belongings nearby, so that the patients do not have to move around, help them safely move to the bathroom, keep the bed in the lowest position, raise side railings as required (N5).* *Based on the nursing diagnoses, the care plan is prepared and the most appropriate nursing activities and interventions are identified to compose the nursing prescription and care plan (N7).* *I usually mobilize patients, put them on the correct position, and help patients realize that they have to maintain this positioning, use the cushion and understand the reason for it. We do not take patients out of bed, but we supervise them, the bed bath, the way things happen, the mobilization (N10).*

Chart 2 – Integration of quantitative and qualitative data from the NREM perspective. Porto Alegre, Rio Grande do Sul, Brazil.

NREM	Quantitative results	Qualitative results
Outcome	Pain Level (P<0.001) Body Positioning: self-initiated (P<0.001) Mobility (P<0.001)	*We have a primary nursing model and we evaluate this patient. Before evolution, I visit the patient, make prescriptions, observe what has improved or worsened, and according to the improvement or worsening in patient condition, I maintain, exclude, or worsen that diagnosis, based on the daily physical examination. Nurses typically observe the outcomes (N8).* *I always think a lot about the care and the outcome for patients. In practice, we write "improved" in the diagnosis or else we exclude the diagnosis. If the patient has impaired physical mobility and is able to get out of bed, use an assistive walker, walk with assistance, I can say that they are improving, but will still have impaired physical mobility at home, because they will need a walker or crutch for months (N1).* *We can see the progression. Impaired physical mobility improves day by day. On the first day, the patient leaves the bed if he can walk with a walker. On the second day, he is already training, and on the third day he is almost ready for discharge. The pain gradually diminishes, and I make the evaluation as the patient reports what he feels. If this were expressed in topics, it would be more precise, more objective. That's what I want, for example partially recovered mobility, recovered mobility. Everything is based on a study, on research, but in practice, this process has to be fast (N4)* *We carry out the assessments every 24 hours and, if necessary, carry out an assessment beforehand, which would be the NOC stage, because we do not have NOC in the system. So we make an assessment, but do not use the book, we make the assessment based on what we have already found (N7)* *After surgery, the pain is surgical, so it can be more controlled, because before the surgery the pain was constant, and after the surgery, patients can walk more normal Then, mobility improves and we change the nursing diagnoses (N9).*

Chart 2 – Cont.
Source: Research data.

Integrated data analysis shows that participants' responses helped to better explain the results of quantitative analysis. This integrated approach demonstrated the importance of several aspects that involve the specifics of the scope of nursing practice in the care of patients undergoing THA, according to the NREM. The following meta-inferences emerged from the analysis of results of integrated mixed methods, according to the theoretical perspective of the NREM:

Structure:

- Acute Pain is a prevalent diagnosis for patients undergoing THA, and its presence is a possible impediment for patients to start walking and safely positioning themselves;
- The presence of the nursing diagnosis Impaired Physical Mobility tends to increase the Risk for Falls; however, it is not the most frequent diagnosis recorded in nursing records.

Process

- Pain control was the most accurate nursing intervention to ensure mobilization and safe positioning;
- Several nursing interventions were made in the nursing diagnosis Impaired Physical Mobility for its control, impacting the diagnosis Acute Pain and Risk for Falls.

Outcomes:

- Based on the clinical assessment of patients, nurses perceive pain mitigation and reduction in the risk for falls, as mobility progresses;
- Progression of mobility is evident, but the patient does not achieve full mobility improvement until hospital discharge.

DISCUSSION

This study is the first to analyze standardized nursing languages in orthopedics from the perspective of the Nursing Role Effectiveness Model. As far as we know, no Brazilian studies have adopted the NREM as an investigative theoretical framework[4]. The mixed method, whose integrated analysis of quantitative and qualitative data (QUAN → QUAL) has made it possible to establish relationships and broaden the focus of discussion based on the NREM. One can glimpse the ability to link the scope of mobility outcomes to nursing interventions on the profile of the nursing diagnoses of this population. However, improvements are needed in diagnostic accuracy and in the recording of patient charts.

Regarding structure, the most frequently recorded nursing diagnosis was Acute Pain, followed by Risk for Falls and Impaired Physical Mobility. Acute Pain is a subjective phenomenon and its perception is complex[7]. The Risk for Falls requires a range of nursing activities to prevent this event[10]. The patients had Impaired Physical Mobility, as their legs remained abducted and hip flexion was less than 90º to avoid dislocation of the prosthesis. This changes the ability to walk, transfer from bed to armchair, intensifies the fear of falling and can worsen postoperative pain. From the NREM perspective, structural variables may affect the processes conducted by nurses. Regarding the association of QUAN and QUAL data, in the statements that indicate Impaired physical mobility it can be seen that this diagnosis was a priority in the study population, followed by pain and the risk for falls, unlike the findings of the QUAN stage. This raises the following question: Why was the Impaired Physical Mobility nursing diagnosis not prevalent? A study carried out in Ireland with 77 patients with hip fracture showed that the independent predictors of mobility one week after hip fracture surgery were related to those patients who fell from heights, did not undergo delayed surgery and had pre-fracture functionality with high scores[11]. These findings suggest reflections on the accuracy of the Impaired Physical Mobility nursing diagnosis in this population. Therefore, further investigation of mobility after hip arthroplasty is needed. Efforts should be made to improve diagnostic reasoning, as this interferes with care planning and patient response to nursing interventions.

In the Process component, Fall Prevention, Pain Control and Positioning interventions were frequent. The NREM proposes that the care process can directly influence patient outcomes. In this study, we focused on independent nursing interventions. It was found that keeping bed in the lowest position, making sure bed wheels are locked, raise bedside railings, keep bell and belongings nearby were activities frequently implemented to intervene in the Risk for Falls[12]. In the THA postoperative period, this prescription is considered appropriate in response to Impaired Physical Mobility. These activities are closely linked to care that supports physical functioning and protection from harm, including combined interventions[2]. In addition, 77 (90%) patients had caregivers during hospitalization, which may have helped to prevent falls, strengthening the relationship between the structure and process variables according to the NREM for the variables[13].

Data from this study showed that the Impaired Physical Mobility nursing diagnosis generated a diverse series of nursing interventions. It can be seen that early mobilization of patients with THA decreases the pain scores experienced and can reduce the length of hospital stay[7], which was confirmed by QUAL data. Moving from a lying to a sitting position (vice versa) or to a standing position can cause orthostatic hypotension, increasing the risk for falls and postoperative complications. This validated the relationship between the Structure and Process component, highlighting the vital signs monitoring nursing intervention that was prescribed for the three diagnoses investigated. The findings suggest that the prescribed care possibly improved the scores of the outcomes evaluated in the study. A scoping review showed that positioning, self-care, and exercise promotion interventions mediated patients' functional status from admission to discharge; however, only partial support was provided, because the rate of nursing interventions was not measured [4]. If the outcomes of physical therapy care had been measured on the basis of the interdependent role, as the NREM suggests, the findings might have been different. Care models based on multidisciplinary teams can provide more efficient use of health resources. In fact, the impact of nursing and/or multidisciplinary interventions on Impaired Physical Mobility must be validated in order to increase the accuracy of this evidence of care. The referred weakness is consistent with the frequency of the Impaired Physical Mobility diagnosis which was relatively low in the QUAN stage compared to QUAL evidence. This points to the need for actions that promote the training of professionals in diagnostic accuracy,

availability of assessment systems or diagnostic scales to assess the degree of mobility impairment. One example is the study by Munter et al., who used the Cumulated Ambulation Score to assess independence in basic mobility shortly after hip fracture surgery. Findings showed that fatigue and pain were the most frequent reasons for patients not achieving an independent baseline mobility level (>85%) or not fully completing planned physical therapy (>42%) at three days of follow-up. At hospital discharge (median day 10), only 54% of patients had recovered their pre-fracture basic mobility level [14]. This can be a reliable, valid and sensitive instrument to assess mobility post THA[15].

An interesting aspect about the structure component of the NREM is that 99% of the sample used orthopedic beds with Balkan frame and trapeze, and 42 (49%) patients had a private toilet, and sixty (70%) of them reported walking to the bathroom. This encompasses a special care process for patients recovering from this surgery. A study conducted in Europe on the importance of using auxiliary devices in the rehabilitation from hip and knee replacement showed that 95% of the participants stated that they had increased their ability to perform activities of daily living and were eligible for early discharge[16]. Despite the evidence of prevalence of the Structure component, in that study, the rate of nursing prescription on the use of bed with Balkan frame and trapeze was low, suggesting a weak relationship between the Structure and Process component with this phenomenon. It can also be questioned whether those patients who did not count on a private toilet walked through the corridors to the shared bathroom or used a wheelchair. This could increase the ambulation/mobilization distance in the postoperative period of THA, and would be clinically positive for the Outcome component in the NREM. Such information was not identified in the mixed method findings. Anyway, the data draws attention, as patients show progress in mobility outcomes. In NREM, planning the relationships between Structure, Process and Outcome variables helps to emphasize the importance of validating the outcomes investigated in the model[4].

Regarding the Outcomes component, progression of mobility, pain reduction and prevention of falls were observed. The Body Positioning: Self-initiated and Mobility outcome increased by nearly two points during follow-up. This evaluation comprised a series of observations such as: moving from a lying to a sitting position, from sitting to standing and vice versa, first step with the operated limb; keep the operated leg straight, lean on the walker so it supports patient weight, in order to reduce the risk for falls. A study carried out in a hospital in southern Brazil with orthopedic patients showed that, despite a progressive evolution of mobility outcomes observed, nursing interventions were not related to changes in NOC scores[17]. This fact is demonstrated in our study that related the findings of the process and outcomes components according to the theoretical frame of the NREM.

Another factor identified in the two phases was the clinical and significant improvement in the Pain Level outcome scores. The THA postoperative period requires effective analgesia to ensure the necessary comfort for walking[18]. Recording pain as the fifth vital sign and analgesia after evaluation were highlighted as the main nursing interventions. This finding exposes the existence of a relationship between the components of structure, process and outcome in pain management. An expert consensus study suggests outcome indicators to assess pain after arthroplasty, focusing on functional improvement and prevention of chronic pain, in addition to measuring the impact of nursing interventions, as it is a strong predictor of worsening mobility[19]. This may be the reason why nurses were more likely to classify more pain management activities. As surgical pain decreased, mobility improved. However, the findings did not include the intervention dose, for example: how many times a day the patient's pain level was checked. The NREM allows exploring the specific contributions of nursing to patient outcomes [4]. In this line of thought, it is important to highlight the understanding of how much a specific nursing intervention is necessary to achieve a therapeutic effect.

The findings of the QUAL approach supported data identified in the QUAN approach, mainly in the outcome evaluation model used in the study field. The interviews revealed that although NOC outcomes were not recorded at the health institution, the respondents mentioned that they used the terms "improved", "worsened", "maintained" and "resolved" to assess the status of nursing diagnosis. The relationship between QUAN and QUAL data was valid for the THA postoperative period insofar as the improvement in mobility is evidenced. This finding expressed the integration of the analyzes of the two phases of this research, clarifying the differences and similarities in the clinical applicability of standardized nursing languages in orthopedics from the perspective of the Nursing Role Effectiveness Model. However, patients would still have this diagnosis "maintained" at hospital discharge, as seen in Table 1, in which NOC scores did not reach 5 points on the Likert scale on the last day of assessment, validated in the identified meta-inference. In the NREM perspective, this reading may describe how

structural variables are related to the outcomes, and can be mediated by process components[4]. Considering these findings, it is clear that the operationalization of standardized nursing languages tends to benefit the quality of nursing records, reducing the subjectivity of the clinical evaluation performed[5]. Educational strategies for training nurses will be essential for the use of these languages in care practice. This favors the validation of nursing diagnoses, interventions and outcomes at the bedside, and such data can provide a basis for decision-making processes, improvements in monitoring indicators and prevention of adverse events such as falls, to which the population of patients undergoing ATQ is subject[20].

Limitations of this study include the fact that clinical observation of the implementation of interventions/activities could provide a better description of the completeness of nursing interventions, including time spent and patient response, than the rate of nursing prescriptions. Variables related to nurses such as length of professional experience, were not evaluated in the model, a fact that could influence the set of competencies and the relationships between NREM components, maximizing the impact of the findings. Therefore, the results of this study should be viewed with caution.

CONCLUSION

The results revealed that the focus of Standardized Nursing Languages in orthopedics, from NREM perspective, lies in the context of mobility, but improvements are needed in diagnostic accuracy and in the recording of patient charts. According to the study findings, it is clear that, although nurses can influence patient outcomes in orthopedic nursing using standardized nursing languages, the interdependent role still needs to be investigated to broaden the perception of the mobility context.

The NREM provides support for standardized Nursing languages, as it relates clinical reasoning, planning and the evaluation of the effectiveness of nursing interventions. The joint analysis of quantitative and qualitative data made it possible to illustrate the various aspects associated to the quality of the nursing process in clinical practice for patients undergoing THA, which would not be possible with the use of a single approach. The present study also shows the need for further research in the area. Further studies may explore the context of mobility in orthopedic patients in the training of nurses in the nursing process, enhancing the use of NANDA-I, NIC and NOC. In the future, further research based on the NREM will be needed to expand the association between the variables included in the model, evaluating the accuracy of the Impaired Physical Mobility nursing diagnosis, in addition to measuring the dose of nursing intervention, its association with orthopedic patient outcomes and the influence of multidisciplinary interventions.

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