# Development of the nursing diagnosis risk for pressure ulcer

*Desenvolvimento do diagnóstico de enfermagem risco de úlcera por pressão*

*Desarrollo del diagnóstico de enfermería riesgo de úlcera por presión*

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## ABSTRACT

**Objective:** The study objective was to develop the definition and compile the risk factors for a new Nursing Diagnosis entitled "Risk for pressure ulcer". The process was guided using the research question, "What are the risk factors for development of a PU and what is its definition?"

**Method:** An integrative literature review was conducted of articles published in Portuguese, English or Spanish from 2002 to 2012 and indexed on the Lilacs/SCIELO, MEDLINE/PubMed Central and Web of Science databases. The final sample comprised 21 articles that provided answers to the research question. These articles were analyzed and summarized in charts.

**Results:** A definition was constructed and 19 risk factors were selected for the new nursing diagnosis, "Risk for pressure ulcer".

**Conclusions:** Identification and definition of the components of the new nursing diagnosis should aid nurses to prevent pressure ulcer events.

**Keywords:** Pressure ulcer. Nursing diagnosis. Nursing process. Risk factors.

## RESUMO

**Objetivo:** Estudo com objetivo de desenvolver a definição e os fatores de risco de um novo diagnóstico de enfermagem denominado risco de úlcera por pressão. Para tanto, utilizou-se a questão norteadora: "o que é úlcera por pressão e quais os seus fatores de risco?"

**Método:** Revisão integrativa da literatura referente a artigos publicados em português, inglês e espanhol, no período entre 2002-2012, nas bases de dados eletrônicas *Lilacs/SCIELO, MEDLINE/PubMed Central* e *Web of Science*. A amostra foi composta por 21 artigos que responderam à questão norteadora, os quais foram analisados por meio de quadros sinópticos.

**Resultados:** Desenvolveu-se a definição e elencaram-se 19 fatores de risco para o novo diagnóstico de enfermagem denominado Risco de úlcera por pressão.

**Conclusão:** A identificação e a definição desses componentes do novo diagnóstico de enfermagem poderão auxiliar o enfermeiro na prevenção do evento úlcera por pressão.

**Palavras-chave:** Úlcera por pressão. Diagnóstico de enfermagem. Processos de enfermagem. Fatores de risco.

## RESUMEN

**Objetivo:** El desarrollo de la definición y de los factores de riesgo de un nuevo diagnóstico de enfermería denominado Riesgo de úlcera por presión. La pregunta guía fue: "¿Qué es úlcera por presión y cuáles son los factores de riesgo?

**Método:** Revisión integradora de la literatura con artículos en portugués, inglés y español publicados entre 2002 y 2012 en las bases de datos electrónicos Lilacs/SCIELO, MEDLINE/PubMed Central y Web of Science. La muestra fue compuesta por 21 artículos que respondieron a la pregunta guía de la encuesta los cuales fueron analizados mediante cuadros sinópticos.

**Resultados:** Se desarrolló la definición y se enumeraron 19 factores de riesgo para el nuevo diagnóstico de enfermería de Riesgo de úlcera por presión.

**Conclusión:** La encuesta permitió identificar y definir los componentes de ese nuevo diagnóstico de enfermería que auxiliará al enfermero en la prevención de la úlcera por presión.

**Palabras clave:** Úlcera por presión. Diagnóstico de enfermería. Procesos de enfermería. Factores de riesgo.

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## INTRODUCTION

Currently, the global prevalence rate of pressure ulcers (PU) in hospitals is around 12% in general wards and 23% in acute care units.[1-4] These elevated rates indicate the existence of a problem that merits investigation, since it is known that in the majority of cases PU can be avoided by identification of risk factors and initiation of preventative measures. Nurses should compile information related to the risk of PU and, based on their clinical judgment, establish an accurate nursing diagnosis (ND) which can be used as a basis for guiding care of those who are vulnerable.[5-7]

However, until recently the NANDA International© (NANDA-I) classification system did not include a specific nursing diagnosis for the clinical condition described above. In domain 11 of the NANDA-I taxonomic structure (Safety/Protection), class 2 (Physical Injury), there was only an ND for the general situation of risk of skin damage, "Risk for impaired skin integrity", which is defined as "at risk for alteration in epidermis and/or dermis".[8] The definition makes it clear that this is an ND that covers a wide range of situations in which there is a risk of skin alterations. However, it does not offer the specificity of risk factors for damage to other adjacent tissues, such as, for example, adipose, muscle and bone tissues, all of which can also be involved in cases of PU.

As such, it is clear that the diagnostic terminology did not offer an ND that was precise enough to be chosen when faced with situations involving risk of PU, which motivated a team of Brazilian nurses to contact NANDA-I and propose development of an ND specifically for this element of clinical practice. The proposal was founded on the assumption that a lack of accuracy in establishing an ND can have a negative impact on choosing the best nursing interventions for prevention of PU and would therefore be one contributing factor in the increasing rates of prevalence and incidence of this adverse event.[3,5,9] Additionally, it is accepted that it is the nurse's responsibility to identify the risk factors for this threat to patient health, making it possible to plan nursing interventions for the most vulnerable patients and to organize a plan for promotion of patient safety, improving nursing care.

As a result, and in conformity with the Diagnosis Submission Guidelines,[8] which demand that a literature review be conducted, this study was designed to meet the objective of developing the definition and listing the risk factors of a new ND called "Risk for pressure ulcer".

## METHOD

This is an integrative literature review[10] conducted to support development of the definition and compilation of the risk factors to comprise a new ND, "Risk for pressure ulcer",[11] in accordance with NANDA-I guidelines.[8]

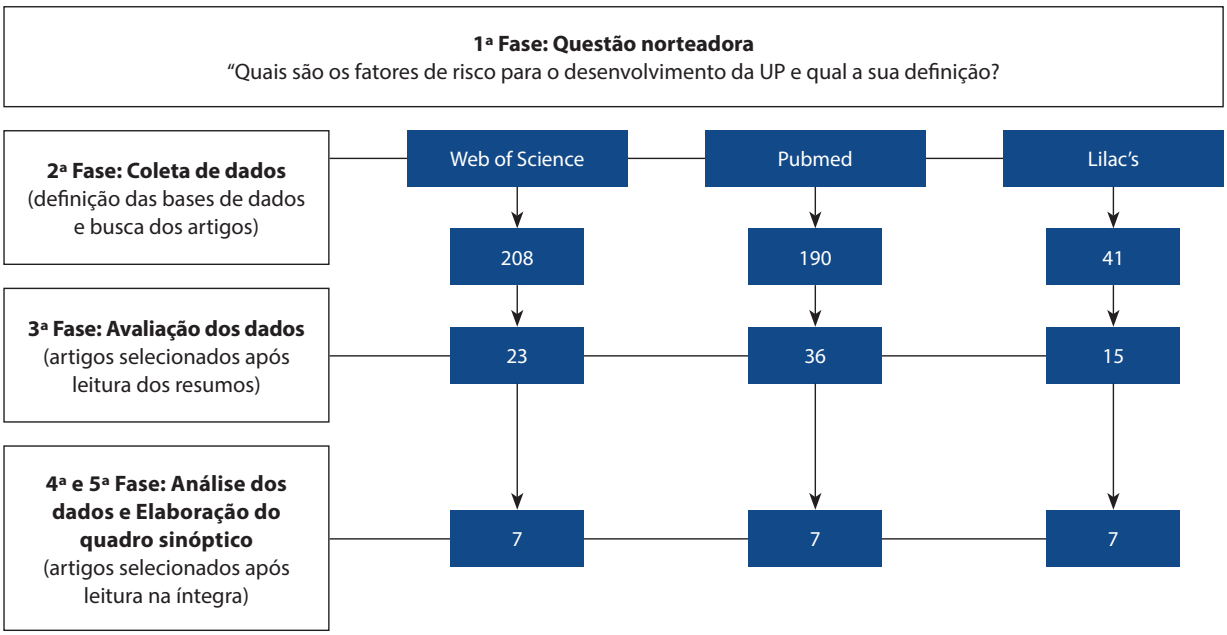


**Figure 1** – Logistics of integrative literature review. Porto Alegre, RS, Brazil, 2014
Source: Research data, 2014.

The problem was defined by the following research questions: "What are the risk factors for development of a PU and what is its definition?"

The study reviewed articles published in Portuguese, English or Spanish from 2002 to 2012 and with the full text available on-line via the Lilacs/SCIELO, MEDLINE/PubMed Central and/or Web of Science electronic databases, indexed with the descriptors Pressure ulcer, Risk factors, Nursing diagnosis; and the keyword Prevention & Control. Articles that did not meet all of these inclusion criteria were excluded even if they covered the subject under investigation.

Data were collected using an instrument covering articles' identification details; objectives; methodologies; results; limitations and recommendations. After analysis and synthesis of data answering the research question, summary charts were constructed. The study took pains to observe ethical considerations, maintaining the authenticity of ideas, concepts and definitions in order to preserve the authorship of the articles reviewed.

## RESULTS

The majority of the 21 studies that contained data pertinent to answering the research question were published in 2011 (28.5%) or 2012 (24%), with a predominance of studies from Brazil (33%) and North-America (19%). The study designs broke down as follows: 28.5% were literature reviews, 19% were cross-sectional and 19% were retrospective cohort studies. There were several different periodicals, of which the Brazilian journal Acta Paulista de Enfermagem (Qualis A2) contributed two studies (9.5%) and the International Journal of Nursing Studies (Qualis A2) contributed three (14%) of the studies reviewed (Chart 1).

| Year of publication | Origin | Type of study | Publication | Qualis or Impact Factor |
|---|---|---|---|---|
| 2012 | Brazil | Cross-sectional | Texto e Contexto | A2 |
| 2012 | Brazil | Prospective exploratory cohort | Acta Paul Enferm | A2 |
| 2012 | United States | Literature review | Critical Care Nurse | A1 |
| 2012 | United States | Retrospective cohort | American Journal of Critical Care | A1 |
| 2012 | Canada | Literature review | Skin Therapy Letter | 0.46 |
| 2012 | India | Literature review | Indian Journal of Plastic Surgery | 0.26 |
| 2011 | Brazil | Retrospective cohort | Rev Gaúcha Enferm | B1 |
| 2011 | United States | Descriptive retrospective | American Journal of Critical Care | A1 |
| 2011 | Germany | Retrospective cohort | International Journal of Nursing Studies | A2 |
| 2011 | Germany | Retrospective cohort | International Journal of Nursing Studies | A2 |
| 2011 | Norway | Literature review | Tidsskr Nor Legeforen | - |
| 2010 | Germany | Systematic literature review | Deutsches Arzteblatt | 0.43 |
| 2009 | Brazil | Cross-sectional | São Paulo Med J. | B1 |
| 2008 | Brazil | Exploratory | Rev Inst Ciênc Saúde | B3 |
| 2008 | Brazil | Update | Acta Paul Enferm | A2 |
| 2007 | Brazil | Prospective cohort | Rev Latino Americana | A1 |
| 2007 | United Kingdom | Prospective cohort | International Journal of Nursing Studies | A2 |
| 2006 | United Kingdom | Literature review | BMJ | A1 |
| 2006 | United States | Cross-sectional | J Pediatr Nurs | 0.79 |
| 2005 | Chile | Cross-sectional | Revista Chilena de Medicina Intensiva | - |
| 2004 | Sweden | Prospective comparative | Scandinavian Journal of Caring Sciences | A2 |

**Chart 1** – Characteristics of articles analyzed. Porto Alegre/RS, 2014
Source: Research data, 2014.

| Definitions of pressure ulcers | Article title | Year |
|---|---|---|
| Area of localized damage to the skin and underlying tissue caused by a local breakdown of soft tissue as a result of compression between a bony prominence and an external surface. | Pressure ulcers[12] | 2006 |
| A localized area that is at risk of developing tissue necrosis or where tissue necrosis has already developed because of unilateral pressure, traction and/or exposure to friction over a certain period of time. | Pressure ulcers-prophylaxis and treatment[13] | 2011 |
| An area of localized soft tissue ischemic necrosis caused by prolonged pressure higher than the capillary pressure, related to posture, which usually occurs over a bony prominence. | Pressure ulcers: back to the basics[14] | 2012 |
| A wound that develops in the upper layers of the skin as the result of sustained, externally applied pressure and then enlarges both radially and into the deeper tissue layers. | Decubitus ulcers: pathophysiology and primary prevention[15] | 2010 |
| Any area of skin or underlying tissue that has been damaged by unrelieved pressure or pressure in combination with friction and shear, occurring when soft tissue is compressed between a bony prominence and an external surface for a prolonged time. | Patient-specific and surgical characteristics in the development of pressure ulcers[16] | 2012 |
| Localized injury to the skin and underlying tissue caused by pressure, shear, friction and/or a combination of these forces. | Relation between pressure, friction and pressure ulcer categories: a secondary data analysis of hospital patients using CHAID methods[17] | 2011 |
| | Skin alterations of intact skin and risk factors associated with pressure ulcer development in surgical patients: a cohort study[18] | 2007 |
| Area of localized cell death in skin and underlying tissues, caused by pressure, shear forces, friction and/or a combination of these. | Risk factors for pressure ulcer development in institutionalized elderly [19] | 2007 |
| Areas of tissue necrosis that tend to develop when soft tissue is compressed between a bony prominence and an external surface for a long period of time. | Pressure ulcers in the elderly: analysis of prevalence and risk factors [20] | 2011 |
| Localized skin damage caused by interruption of blood flow to a given area, caused by heightened pressure over a prolonged period. | The importance of the nursing care in the prevention of the ulcer for pressure in the hospitalized patient[21] | 2008 |
| Localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure, or pressure in combination with shear forces. | Braden subscales analysis as indicative of risk for pressure ulcer [6] | 2012 |
| | Prevention and treatment of pressure ulcers[22] | 2012 |

**Chart 2** – Definition of PU in articles reviewed. Porto Alegre/RS, 2014
Source: Research data, 2014.

| Risk factors for PU | Article title | Year |
|---|---|---|
| Immobility, friction/shear forces, age, length of hospital stay, administration of norepinephrine and cardiovascular diseases. | Predictors of pressure ulcers in adult critical care patients[23] | 2013 |
| Malnutrition, pressure, friction and immobility. | Weight and pressure ulcer occurrence: A secondary data analysis[24] | 2011 |
| Low Braden Scale score, reduced sensation, humidity, fecal and urinary incontinence, anemia, prolonged length of hospital stay, dehydrated skin, chronic diseases, advanced age. | Risk profile characteristics associated with outcomes of hospital-acquired pressure ulcers: a retrospective review[25] | 2013 |
| Immobility, pressure, shear forces and high ambient temperature. Prolonged length of hospital stay, age, weight and surgical treatment. | Immobility – a major risk factor for development of pressure ulcers among adult hospitalized patients: a prospective study[26] | 2004 |
| Critical and chronic diseases, advanced age, malnutrition and anemia. | Malnutrition as a risk factor for the development of pressure ulcers [27] | 2008 |
| High intensity and long duration pressure, immobility, sensory deficits, nutritional factors, advanced age, humidity, friction and shear forces. | Measuring interrater reliability in application of the Braden Scale [28] | 2012 |
| Pressure, shear forces, friction, medications that affect mobility and consciousness, humidity, acute diseases, heart disease, vasomotor alterations, vasoconstriction, pain, hypotension, hyperthermia, reduced level of consciousness, hypoalbuminemia, low hemoglobin levels, malnutrition, obesity, dehydration, smoking. | Efectos de la implementación de un protocolo de prevención de úlceras por presión en pacientes en estado crítico de salud[29] | 2005 |
| Advanced age, nutritional deficits, immobility, friction, diabetes, excessive humidity, prolonged length of hospital stay. | Prevalence of pressure ulcers among the elderly living in long-stay institutions in São Paulo[30] | 2009 |
| Prematurity, immobility, malnutrition. | Skin integrity in hospitalized infants and children: a prevalence survey[31] | 2006 |
| Pressure, shear and friction forces; advanced age combined with health problems such as hip fractures, fecal and urinary incontinence, smoking, dry skin, chronic systemic conditions and terminal disease; immobility; sensory deficits; malnutrition; administration of sedatives, analgesics and antihypertensives; and hypoalbuminemia. | Pressure ulcers[12] | 2006 |
| Pressure, shear and friction forces; humidity, bacterial infections, neuropathies, malnutrition. | Pressure ulcers-prophylaxis and treatment[13] | 2011 |
| Pressure, shear and friction forces, humidity, patient position, immobility, neurological factors, metabolic and nutritional factors, edema. | Pressure ulcers: back to the basics[14] | 2012 |
| Pressure, shear and friction forces, immobility, humidity, variable intolerance of tissues to ischemia, peripheral arterial occlusive disease, consciousness and perception deficiencies, nutritional problems, other chronic comorbidities. | Decubitus ulcers: pathophysiology and primary prevention[15] | 2010 |
| Advanced age, patients with large number of surgeries and longer time in recovery room, chronic diseases such as diabetes, low BMI, use of vasopressors. | Patient-specific and surgical characteristics in the development of pressure ulcers[16] | 2012 |

**Chart 3** – Risk factors for PU described in articles analyzed for integrative literature review. Porto Alegre/RS, 2014 (continue)

| | | |
|---|---|---|
| Pressure, shear forces, friction, immobility. | Relation between pressure, friction and pressure ulcer categories: a secondary data analysis of hospital patients using CHAID methods[17] | 2011 |
| Immobility, nutrition, factors that can affect tissue perfusion, condition of the skin and age. | Skin alterations of intact skin and risk factors associated with pressure ulcer development in surgical patients: a cohort study[18] | 2007 |
| Friction, shear forces, humidity, loss of sensitivity, loss of muscle strength or immobility, incontinence, hyperthermia, anemia, protein malnutrition, smoking and advanced age. | Risk factors for pressure ulcer development in institutionalized elderly[19] | 2007 |
| Friction, shear forces, humidity, reduction and/or loss of sensitivity and muscle strength and immobility. | Pressure ulcers in the elderly: analysis of prevalence and risk factors[20] | 2011 |
| Immobility, prolonged pressures, friction, traumatisms, advanced age, devices such as plasters, altered skin humidity, edema, urinary or fecal incontinence, vitamin deficiency and malnutrition. | The importance of the nursing care in the prevention of the ulcer for pressure in the hospitalized patient[21] | 2008 |
| Pressure, friction, shear forces, humidity, acute and chronic diseases, advanced age, neuropathies, inadequate nutrition, bedridden or wheelchair-bound, urinary and/or fecal incontinence, femoral fractures, administration of sedative medications, immobility and history of PU. | Braden subscales analysis as indicative of risk for pressure ulcer[6] | 2012 |
| Pressure, shear forces, friction, malnutrition, mobility level, reduced activity and positioning, humidity and smoking. | Prevention and treatment of pressure ulcers[22] | 2012 |

**Chart 3** – Risk factors for PU described in articles analyzed for integrative literature review. Porto Alegre/RS, 2014 (conclusion)
Source: Research data, 2014.

Twelve of the 21 articles that remained at the end of the process provided definitions of PU, some of which were similar, as shown in the first summary chart (Chart 2).

All of the 21 articles that were analyzed in the final phase contained descriptions of the risk factors for PU, as shown in the second summary chart (Chart 3).

The data in the summary charts were used to support development of the definition proposal for the new ND "Risk for PU" and to compile a list of 19 risk factors for PU, three of which are extrinsic factors and 15 of which are intrinsic factors (Chart 4).

## DISCUSSION

Analysis of the articles made it possible to answer the research question and provided the foundation for the definition of the new ND entitled "Risk for pressure ulcer" and for identification of its most important risk factors. Studies were found from several different parts of the world that had been published in high-impact journals, reflecting the growing interest in investigating PU. However, the most common type of study was the literature review, which offers a low level of evidence, demonstrating that there is a need to concentrate on clinical research in Nursing.

The first summary chart (Chart 2) lists the 12 (57%) articles that contained a definition of PU. There were four literature review articles (33.3%), three retrospective cohort studies (25%), two prospective cohort studies (16.6%), one systematic literature review (8.3%), one cross-sectional study (8.3%) and one exploratory study (8.3%). Comparison of these findings with those of a systematic review investigating risk factors for PU and preventative measures shows that both studies reviewed a selection of studies with similar designs.[32].

Another systematic review, this one investigating intervention strategies and their results in patients at risk of PU, analyzed randomized studies, controlled clinical trials, cohort studies and systematic reviews.[33] This selection of studies had a profile of study designs that offer higher level evidence, but it should be considered that the objective of that review demanded that the methods be refined to this extent, since it was conducted to analyze interventions and their results. Notwithstanding, in a similar manner to the present study, these studies also had a diverse range

| Nursing diagnosis: Risk for pressure ulcer | |
|---|---|
| Definition – Risk of injury to the cells of the skin and underlying tissues, caused by compression of soft tissues, generally over a bony prominence, for a period long enough to cause local ischemia and, as a result, necrosis. | |
| **Extrinsic factors** | **Intrinsic factors** |
| Shearing forces | Anemia |
| Surface friction | Decrease in serum albumin level |
| Pressure | Impaired circulation |
| | Dehydration |
| | Inadequate nutrition |
| | Decrease in tissue perfusion |
| | Decrease in tissue oxygenation |
| | Edema |
| | Aging |
| | Hyperthermia |
| | Decrease in mobility |
| | Obesity |
| | Prematurity |
| | Alteration in sensitivity |
| | Smoking |
| | Humidity |

**Chart 4** – Definition of the ND "Risk for pressure ulcer" and its risk factors. Porto Alegre/RS, 2014
Source: Research data, 2014.

of origins, confirming the global scope of the concern with investigating PU.

The definitions of PU contained in the 12 articles reviewed cover several different elements of the pathophysiology of this condition, such as the roles of pressure, shear forces and friction, associated with ischemia and tissue necrosis, and the sites generally over bony prominences. The definitions contained in the studies have similar foundations and some of them refer to the currently most widely-used definition, which is described in Prevention and Treatment of Pressure Ulcer: Clinical Practice Guideline,[34-36] which states that PU is a "localized injury to skin and/or underlying tissues, normally over a bony prominence, as a result of pressure or a combination of pressure and torsion forces".[34]

In a similar manner, one Portuguese study and one North American study used the NPUAP and EPUAP guidelines and defined PU as "injury, inflammation or wound to skin or underlying structures resulting from tissue compression and inadequate perfusion"[37] and as "localized areas of tissue destruction caused by compression of soft tissues between a bony prominence and an external surface, for a prolonged period of time".[38] Brazilian studies have also based their definitions on the NPUAP and EPUAP guidelines, describing PU as "injuries to skin or underlying tissues resulting from pressure combined with friction forces",[39] and as "a localized area of cell death that develops when skin and/or soft tissues are compressed, generally over a bony prominence, as a result of pressure or a combination of pressure, friction and shear forces".[40]

As such, based on the definitions contained in these studies, the new ND "Risk for pressure ulcer" was defined as, "Risk of injury to the cells of the skin and underlying tissues, caused by compression of soft tissues, generally over a bony prominence, for a period long enough to cause local ischemia and, as a result, necrosis.[11] Both the etiology and pathophysiology of PU were taken into account to arrive at this definition.

The risk factors for PU described in the 21 studies analyzed were classified as extrinsic or intrinsic (Charts 3 and 4). Pressure ulcers are wounds with multifactorial origins, and so the larger the number of risk factors present for a given individual, the greater the challenge for prevention and, as a result, the more accurate the nurse's diagnosis needs to be.

The effects of the most-often-cited extrinsic risk factors (pressure, shear forces and friction) are related to intensity, duration and the tolerance of individuals' tissues to these types of abrasive forces. Prolonged pressure causes distortions to soft tissues and results in destruction of tissues close to bone; which is the reason for the cone-shape of many PU, with more serious involvement in deeper areas, i.e., in bone tissues. Friction and shear forces cause mechanical overload to soft tissues and so the skin cannot move freely, causing blood vessels to rupture and preventing oxygen flow, leading to tissue ischemia.[35]

Among the intrinsic factors related to the patient's condition, the most prevalent are immobility, extremes of age (prematurity, advanced age), inadequate nutrition (malnutrition and obesity), humidity, decrease in tissue perfusion and oxygenation, decrease in serum hemoglobin levels, dehydration, hyperthermia, impaired circulation, smoking and edema. Since the risk factors are diverse, nurses must carefully assess patients' general status to identify those who are most vulnerable. It is known that patients whose general status is compromised have blood supply that is insufficient to provide nutrition to the tissues, since oxygenation of tissues prioritizes the vital organs, and these patients will require preventative measures immediately after first admission.[5,35]

Recognition of the risk factors for PU is essential in order to detect the causes that precipitate injury, to institute prophylactic measures and to channel interventions to the most vulnerable patients. Against this background, the new ND will help nurses to achieve an accurate diagnostic process, based on data collection, in order to provide a foundation for prevention of injury.

## CONCLUSIONS

Development of the ND "Risk for pressure ulcer" by means of an integrative literature review conferred consistency on the study since it revealed the state of the art and provided an opportunity for deepening knowledge of the subject. The title of the new ND highlights the focus of the diagnosis through representation of the potential health problem, and its definition is based on the pathophysiology of the PU, according to the current literature.

The risk factors listed are directly linked to development of PU and should provide nurses with a basis for patient assessments, using the ND of risk accurately. As such it will be possible to identify the patients most vulnerable to this type of condition, to prevent this adverse event (PU) and to facilitate improvements in patient care and safety.

Both the definition and the risk factors identified in this study were sent to the NANDA-I Diagnosis Development Committee for appraisal, which approved the proposal with some modifications. The new ND was published in the 2015-2017 edition of the NANDA-I classification.

One limitation of this study is the fact that the search for publications was restricted to a ten-year period, which means there could be other studies of the subject that were not analyzed. Notwithstanding, it is believed that the most important contribution is that the articles that were analyzed answered the research question and provided the foundation for development of a new ND, which will become part of the NANDA-I taxonomy.

This new ND was developed in response to a need identified in clinical practice and it is hoped it will facilitate accurate judgments about the risk of PU and will provide nurses with a basis for implementation of preventative measures to reduce the incidence of this threat to patients' health.

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