NURSING SCIENTIFIC PRODUCTION ON DIAGNOSTIC REASONING: INTEGRATIVE REVIEW

Objective: to analyze the scientific nursing production on diagnostic reasoning. Method: integrative review carried out in the Web of Science and in the Scientific Electronic Library Online (SciELO) in May 2014 and using the descriptor "nursing diagnosis" and the keyword "reasoning" in Portuguese and English in order to answer the research question: how have scientific publications of nursing addressed the diagnostic reasoning process? Results: the search resulted in fourteen publications that describe various aspects of reasoning such as the benefits and difficulties of using the diagnostic reasoning in nursing and strategies promoting this type of clinical reasoning. Conclusion: it is necessary to increase publications on diagnostic reasoning, as this leads the nurse to formulate the diagnosis that best define the individual's response to the self-health condition this way leading to diagnostic accuracy.

Descriptors: Nursing Diagnosis; Judgment; Cognition.

RESUMO
Objetivo: analisar a produção científica da enfermagem acerca do raciocínio diagnóstico. Método: revisão integrativa feita na Web of Science e na Scientific Electronic Library Online (SciELO) no mês de maio de 2014, com a utilização do descritor “diagnóstico de enfermagem”, ou “nursing diagnosis”, e da palavra-chave “raciocínio” ou “reasoning”, para responder à questão da pesquisa: o que as publicações científicas da enfermagem vêm abordando sobre o processo de raciocínio diagnóstico? Resultados: evidenciaram-se 14 publicações que retratam diversos aspectos desse raciocínio, como os benefícios e dificuldades de utilização do raciocínio diagnóstico em enfermagem e estratégias de fomento a esse tipo de raciocínio clínico. Conclusão: é necessário o aumento de publicações sobre o raciocínio diagnóstico, pois ele conduz o enfermeiro para a formulação do diagnóstico capaz de melhor definir a resposta do indivíduo ao seu estado de saúde, conduzindo assim para a acurácia diagnóstica. Descriptores: Diagnóstico de Enfermagem; Julgamento; Cognição.
INTRODUCTION

The scope of Nursing when it comes to diagnosis is to identify the responses of persons, groups or communities toward health problems or vital processes. For this, a number of information obtained by anamnesis, physical examination and results of diagnostic tests are used, to guide mental operations with the goal of formulating an accurate nursing diagnosis as the basis to drawn interventions and nursing desired results.

As part of the nursing process, the diagnosis makes it possible to develop a more efficient service with focus on patient safety and identification of the needs of the individual under a holistic perspective, allowing for an individualized and enhanced care.1

Nurses need to develop skills to diagnose. Nursing diagnosis demonstrates the scientific knowledge and clinical nursing practice as well as requires intellectual skills and mental processes in diagnostic knowledge and the use of this knowledge. Therefore, the cognitive process of elaboration of nursing diagnoses is commonly called diagnostic reasoning.2

Diagnostic reasoning involves recognizing manifestations of signs and symptoms in the patient, analysing and evaluating data and clinical situations that will unfold in a diagnostic formulation.3

This is a complex practice in which the nurse makes judgments about the clinical condition of the patient, identifies nursing diagnoses and takes decisions. As a result, cognitive ability, clinical knowledge and experience are linked to the diagnostic reasoning process, integrated by intuitive perception of the situation as a whole.4

The diagnostic reasoning process is an interpretative cognitive process, product of a sequence of steps starting with the collection of data about the situation of the individual, family or community and ending with the description of the inference made by the professional concerning what was observed.5

The interest in developing this study emerged from the fact that diagnostic reasoning is a relevant issue that calls for further discussion and development within academies, as it impacts directly on clinical practice, nursing care and expected results.

Thus, the aim of this study was to identify and analyse the nursing scientific production on diagnostic reasoning.

METHODOLOGY

This is an integrative review that followed six stages: identification of the theme and proposal of the research question, establishment of selection criteria, categorization of studies, analysis of the studies included in the review, interpretation of results and synthesis of knowledge.6

The research question that guided the study was: how have scientific publications of nursing addressed the diagnostic reasoning process?

Selection of studies took place in May 2014 and used the Web of Science and the Scientific Electronic Library Online (SciELO) databases. The search used the descriptor of health sciences (Decs) “nursing diagnosis” and the keyword “reasoning”, both in Portuguese and English. As inclusion criteria, the following characteristics were adopted: articles published from 2004 to 2013, available in full-length in Portuguese, English or Spanish and that addressed the theme under analysis. Editorials, theses and dissertations indexed in databases addressing the theme were excluded.

The use of the descriptor “nursing diagnosis” in SciELO resulted in 7,186 published articles. The combination of this with the keyword “reasoning” by the Boolean operator and refined the search to 87 publications which had the title and abstract analysed. However, whenever the title and abstract were not enlightening, the article was read in full length, to avoid exclusion of important studies. The 62 pre-selected articles were read in their full length. The search in this database ended up with a total of 10 publications.

The search with the descriptor “nursing diagnosis” in the database Web of Science resulted in 9,033 publications. After combining “nursing diagnosis” with “reasoning” using the Boolean operator and, 427 articles remained, and these had abstracts read and a pre-selection of articles was performed. At the end of reading the entire pre-selected articles from the abstract, 4 articles were selected.

For analysis and synthesis of the 14 references included in the study sample, a summary table including the following...
Costa CP da, Araújo MHBL.

Nursing scientific production on diagnostic reasoning features was used: title of the paper, authors' names, year of publication, journal of publication, methodology, results and conclusions (Figure 1).
## RESULTS

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Journal          / Year</th>
<th>Methodology</th>
<th>Results</th>
<th>Conclusion</th>
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<tbody>
<tr>
<td>Evidence-based practice applied to diagnostic reasoning</td>
<td>Cruz DLM; Pimenta CAM;</td>
<td>Latin-Am. Nursing journal / 2005</td>
<td>Description of methodology absent. The objective of the study is to discuss the application of principles of evidence-based practice to diagnostic decisions in nursing care.</td>
<td>A clinical case is presented to exemplify the use of evidence-based practice in diagnostic reasoning.</td>
<td>It is recommended to encourage studies on the concepts of nursing diagnoses and development of valid and reliable tests that generate strong evidences that support the diagnostic practice in nursing.</td>
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<tr>
<td>Evaluation of the Outcome-Present State Test Model as a way to teach clinical reasoning</td>
<td>Bartlett R.; Bland AR; Rossen E; Kautz D; Benfield S; Carneval e T;</td>
<td>Journal of Nursing Education / 2008</td>
<td>Quasi-experimental study in which the Outcome-Present State Test (OPT) model to promote clinical reasoning skills of 43 nursing students was evaluated.</td>
<td>The maximum score of OPT is 74. The average of students in the pre-test case study was 58.62 (SD = 8.15), and 66.39 (SD = 5.28) in the post-test case study.</td>
<td>The OPT model is a strategy that supports the development of clinical reasoning skills. However, the OPT model needs to be compared to other strategies that promote clinical reasoning in order to test its validity as criteria.</td>
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<td>The teaching-learning process of the nursing diagnosis - a literary analysis</td>
<td>Bittencourt GKGD; Crossetti MGO;</td>
<td>Online Brazilian Journal of Nursing / 2009</td>
<td>Reflective study aimed at discussing the teaching and learning process of nursing diagnosis.</td>
<td>Two aspects are discussed: clinical reasoning to identify the nursing diagnosis and the teaching and learning process of nursing diagnosis.</td>
<td>Teaching and learning of nursing diagnosis should encourage the use of critical thinking and clinical reasoning to achieve accuracy in nursing diagnosis.</td>
</tr>
<tr>
<td>Clinical reasoning and critical thinking</td>
<td>Cerullo JASB; Cruz DLM;</td>
<td>Latin-Am. Nursing journal / 2010</td>
<td>Literature review on the databases LILACS, SciELO, PubMed and CINAHL with the objective to identify and analyse studies of the nursing literature on clinical reasoning and critical thinking</td>
<td>The analysis of 25 selected articles allowed a discussion on specificities of clinical reasoning in nursing, the use of critical thinking and improvement of clinical reasoning as well as on</td>
<td>The study showed a gap of knowledge on the subject and the need to test strategies for improvement of clinical reasoning.</td>
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### Determinants of the accuracy of nursing diagnoses: influence of ready knowledge, knowledge sources, disposition toward critical thinking, and reasoning skills

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<tr>
<td>Paans W; Sermeus W; Nieweg R; Van Der Schans C;</td>
<td>Journal of Professional Nursing / 2010</td>
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Randomized controlled study with two groups of 50 students in each group designed to determine the influence of disposition toward information, sources of knowledge, disposition toward critical thinking and reasoning skills over the accuracy of nursing diagnosis.

There was no correlation between ready knowledge and degree of diagnostic accuracy with Kendall's tau correlation coefficient of 0.9. Disposition toward knowledge, sources of knowledge, disposition toward critical thinking and reasoning skills correlated with diagnostic accuracy.

### Difficulties of nursing students in learning nursing diagnosis, from the perspective of metacognition

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<tr>
<td>Silva AGIS; Peixoto MAP; Brandão MAGB; Ferreira MA; Martins JSA; Goes FSN; Fonseca LMM; Furtado MCC; Leite AM; Scochi CG;</td>
<td>Esc. Anna Nery / 2011</td>
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Descriptive and qualitative study with participation of 19 nursing students. The study aimed to investigate the students' difficulties in learning nursing diagnosis process under the metacognitive perspective.

The main difficulties identified in the diagnostic learning process were poor theoretical basis and poor mental process required to organization and use of diagnostic knowledge.

### Evaluation of the virtual object of learning diagnostic reasoning in nursing applied to the premature newborn

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<tr>
<td>Goes FSN; Fonseca LMM; Furtado MCC; Leite AM; Scochi CG;</td>
<td>Latin-Am. Nursing journal / 2011</td>
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Descriptive study to evaluate the virtual object of interactive learning where 12 experts in computer science and 31 experts in nursing participated.

Among the 45 items evaluated by computer experts, only two items related to informational density did not reach the percentage of 70% (agree and strongly agree) established. With respect to nursing, all 46 items reached this validation criteria.

The virtual object developed is suitable to be available and used in neonatal nursing education and training of nurses on nursing diagnosis reasoning in the care of premature newborns.

### Nursing diagnosis: educational strategy based on metacognition

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<tr>
<td>Lira ALBC; Lopes</td>
<td>Latin-Am. Nursing journal / 2011</td>
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Experimental study with participation of 30 nursing students. The study was designed to determine the influence of disposition toward information, sources of knowledge, disposition toward critical thinking and reasoning skills over the accuracy of nursing diagnosis.

Both groups identified the defining characteristics, related factors and diagnoses. Despite the fact that students of the two groups identified few defining characteristics in the
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<tr>
<td>Virtual Patients for assessment of clinical reasoning in nursing - A pilot study</td>
<td>Forsberg E; Georg C; Ziegert K; Fors U</td>
<td><strong>Nurse Education Today / 2011</strong></td>
<td>2011</td>
<td>Pilot study designed to evaluate the clinical reasoning of nursing students using virtual patients. There was limitation on the collection of information from the virtual patient, but there was quality of description of each clinical case and most of the students supported the virtual patient in the evaluation of clinical reasoning. Virtual patients were well accepted by students as a method of evaluation to clinical reasoning in nursing. It was possible to develop cases that reflected specific problems of nursing practice.</td>
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<tr>
<td>Analysis of clinical reasoning of the undergraduate nursing student at implementing the systematization of nursing care</td>
<td>Pereira AH; Diogo RCS;</td>
<td><strong>J Health Sci Inst. 2012</strong></td>
<td>2012</td>
<td>Descriptive, exploratory and quantitative study with 50 nursing students. A case study of a patient with hepatic cirrhosis delivered to the students for them to choose nursing diagnoses, interventions and nursing outcomes that are priority for that clinical case. 84.5% of students gave correct answers on the phase of interventions, 68.5% on the defining characteristics of nursing diagnosis, 64.5% on the expected results and 50.3% gave incorrect answers on the related factors of nursing diagnoses. It was concluded that students have facility to use clinical reasoning to define the phases of nursing intervention and expected outcome but have difficulty in using clinical reasoning to define related factors of nursing diagnoses.</td>
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<tr>
<td>Development and evaluation of a software that checks diagnostic accuracy</td>
<td>Jensen R; Lopes MHBM; Silveira PSP; Ortega RS; Carvalho</td>
<td><strong>Journal of Nursing USP / 2012</strong></td>
<td>2012</td>
<td>Methodological study designed to describe the development and evaluation of a software that checks the diagnostic accuracy of nursing students. Experts found that the software achieved its goal, successfully meets the needs and is within compliance of specification and use. It was considered excellent, very good or good by 96.2% of students in terms of usability. The developed software allowed for a measurable evaluation of the diagnostic accuracy of the student and favoured the learning process of nursing diagnoses.</td>
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<tr>
<td>Contribution of Carvalho Brazil</td>
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<td></td>
<td>Description of methodology Aspects related to production Standardized language systems</td>
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<tr>
<td>Standardized Languages for Production of Knowledge, Clinical Reasoning and Clinical Nursing Practice</td>
<td>Nursing Journal / 2013</td>
<td>absent. Arguments supporting the use of systems of standardized languages for the development of nursing as a discipline and profession were presented.</td>
<td>offer formal structure to support clinical reasoning, organize knowledge and organize nursing experience.</td>
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<tr>
<td>Critical Thinking Skills in the Diagnostic Process in Nursing</td>
<td>Bittencourt GKGD; Crossetti MG;</td>
<td>Journal of Nursing USP / 2013</td>
<td>Descriptive, exploratory and qualitative study with the objective to identify critical thinking skills in the diagnostic process through application of clinical case to seven nursing students for identification of critical thinking skills.</td>
<td>The critical thinking skills identified in the diagnostic process in nursing were: analysis, technical and scientific knowledge, logical reasoning, clinical experience, knowledge of the patient, application standards, insight and contextual perspective. The skills of critical thinking establish a relationship between them and the stages of the diagnostic process in nursing. Application of the diagnostic process in nursing figures as a strategy that makes the development of different critical thinking skills possible.</td>
</tr>
<tr>
<td>Effect of Continuing Nursing Education on Nurses' Attitude Toward and Accuracy of Nursing Diagnosis</td>
<td>Collins A;</td>
<td>International Journal of Nursing Knowledge / 2013</td>
<td>Quasi-experimental study performed with 100 nurses in order to test the effectiveness of an educational intervention on nursing diagnosis, critical thinking and clinical reasoning.</td>
<td>There was a significant difference in the mean attitude between control and experimental groups and in the accuracy of nursing diagnosis. Continuing education collaborates with clinical reasoning because it contributes to improved attitudes and to the accuracy of nursing diagnosis. The use of continuing education strategies to enhance clinical reasoning is recommended.</td>
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Figure 1: Selected articles according to title, authors, journal, year of publication, methodology, results and conclusion. Teresina, Piaui, 2014.
DISCUSSION

The sample of 14 publications consisted in 10 national and four international studies. As shown in Figure 1, with respect to year of publication, there were more publications in 2011 with four articles, followed by the year 2013 with three articles. With regard to the journal where studies were published, the Latin American Nursing journal had more publications with four articles, followed by the Journal of Nursing of the University of São Paulo (USP) with two articles.

Regarding the methodology used, the studies use diversified methods, ranging from descriptive researches to randomized studies. With regard to the subjects involved in the researches, the analysed studies include nursing students, nurses and computer experts (when it comes to the use of information and communication technologies for the improvement of diagnostic reasoning).

With respect to the theme under analysis, the diagnostic reasoning process requires from nurses a questioning attitude to direct the collection of data to be interpreted, evaluate and group data in order that they become able to judge and infer the real response of the individual to health problems and assist in decision making. For this, the development of critical thinking skills is indispensable to reach the outcome of the diagnostic process in nursing.1,7

The improvement of critical thinking is fundamental to achieve diagnostic accuracy, since the establishment of nursing diagnoses is a complex and multidimensional process that requires a critical attitude. However, critical thinking must not be confused with clinical reasoning that provides the formulation of nursing diagnosis, because the former involves some skills and attitudes necessary for the development of diagnostic reasoning, but the last is a broader process based on accumulated knowledge, clinical experience and context.8

Hence, cognitive skills and mental habits typical of the critical thinking are essential for diagnostic reasoning, as they allow the development of accurate nursing diagnoses able to add the best clinical evidence, this way contributing to the development of evidence-based nursing.9

Clinical reasoning and fostering critical thinking are of paramount importance in the identification of nursing diagnosis with a view to train nurses with analytical and cognitive skills, nurses that are able to use their judgment, inference and perception to identify health needs of patients and decide the required nursing care.4

An integrative review that analysed nursing studies on clinical reasoning and critical thinking showed the paucity of publications that emphasize the improvement of clinical reasoning, with the inclusion of reflexive strategies and the incorporation of psychosocial and emotional issues that permeate the scope of nursing.8

Systems of standardized languages figure as an instrument of support to clinical reasoning because they offer a formal structure that supports clinical reasoning, organize knowledge and organize nursing experience allowing for the construction and organization of knowledge in this science.10

However, with respect to diagnostic learning in nursing, students showed that they face many difficulties in the process of learning to diagnose. These range from the act of expressing diagnosis in written words in the format required by the diagnostic taxonomy, to the control and monitoring of the thought process involved in the diagnostic reasoning with use of knowledge, clinical experience, judgment and diagnostic inference.2

Convergent with this issue, when it comes to identifying in which of the stages of Systematization of Nursing Assistance (SNA) nursing students have difficulty in performing clinical reasoning, it was evident that the main difficulty in using clinical reasoning was in the diagnostic reasoning process to define related factors of nursing diagnoses as opposed to the lower difficulty using clinical reasoning to define the intervention and expected result.11

Still, with respect to the difficulties of the teaching-learning process and the implementation of nursing diagnosis, the study demonstrates a lack of basic requirements for developing the diagnostic activity, lack of investment from the universities into cognitive process of diagnostic reasoning and basic mental operations to learn how to diagnose, individual difficulties of students in handling diagnostic classifications and also absence
of focus on metacognition that involves self-awareness and awareness of clinical reasoning which results in the nursing diagnosis.2

The diagnostic ability of nursing students evolves as a function of their experience and their clinical knowledge which is a key, however insufficient, component of the diagnostic reasoning. Therefore, the disposition toward knowledge along with the ability to add new information to the existing knowledge, sources of knowledge and aptitude for critical thinking are essential for diagnostic accuracy.3,12

The literature brings successful experiences with respect to teaching resources built to mitigate the difficulties encountered in the process of diagnosing nursing. These are the use of information and communication technologies in the teaching-learning process with development and evaluation of a virtual learning object on diagnostic nursing reasoning applied to premature newborns;13 development and evaluation of a software that checks the diagnostic accuracy of nursing students14; focus on teaching strategies designed to promote clinical reasoning with the use of a virtual patient15 and the use of a mental test model to support the development of clinical reasoning skills.16

In addition, the use of problem-based learning (PBL) was evident as a teaching strategy that helps in establishing the clinical reasoning and diagnostic judgment by constructing knowledge through problem analysis.17

Finally, in the professional scope, continued education stands out as a strategy for improvement of clinical reasoning and formulation of nursing diagnoses with a significant increase in diagnostic accuracy in professional groups undergoing courses or trainings that focus on diagnostic reasoning through continued education.18

CONCLUSION

The 14 publications included in the present study allowed us to learn and analyse the scientific production of nursing on diagnostic reasoning. It was evident that there is a growing trend of publishing in recent years, but the number of studies addressing this issue is still incipient. So, it is necessary to intensify the research on this topic.

The present situation of publications on diagnostic reasoning needs to be reversed. Diagnostic reasoning is a complex cognitive process that directs the nurse to formulate the diagnosis title able to better define the individual’s response to his/her health condition, and to lead to diagnostic accuracy.

Thus, studies that highlight the appreciation of this type of clinical reasoning are of great relevance, with reflective strategies aimed at diagnostic accuracy, minimization of difficulties in the process of diagnosing in nursing (with the use of teaching strategies with active methodologies and focusing on the effective participation of the student) and the provision of educational opportunities for nurses (focusing on nursing diagnosis, clinical reasoning and use of taxonomies).

REFERENCES

5. Carvalho EC, Jesus CAC, Bachion MM. Raciocínio clínico e estabelecimento dos diagnósticos, dos resultados e das

Português/Inglês


17. Lira ALBC, Lopes MVO. Tratamento medicamento do craving em usuários...
Tratamento medicamentoso do craving em usuários...