REVIEW

What factors influence the prevalence and accuracy of nursing diagnoses documentation in clinical practice? A systematic literature review

Wolter Paans, Roos MB Nieweg, Cees P van der Schans and Walter Sermeus

Aim. To identify what determinants influence the prevalence and accuracy of nursing diagnosis documentation in clinical practice.

Background. Nursing diagnoses guide and direct nursing care. They are the foundation for goal setting and provide the basis for interventions. The literature mentions several factors that influence nurses’ documentation of diagnoses, such as a nurse’s level of education, patient’s condition and the ward environment.

Design. Systematic review.

Method. MEDLINE and CINAHL databases were searched using the following headings and keywords: nursing diagnosis, nursing documentation, hospitals, influence, utilisation, quality, implementation and accuracy. The search was limited to articles published between 1995–October 2009. Studies were only selected if they were written in English and were primary studies addressing factors that influence nursing diagnosis documentation.

Results. In total, 24 studies were included. Four domains of factors that influence the prevalence and accuracy of diagnoses documentation were found: (1) the nurse as a diagnostician, (2) diagnostic education and resources, (3) complexity of a patient’s situation and (4) hospital policy and environment.

Conclusion. General factors, which influence decision-making, and nursing documentation and specific factors, which influence the prevalence and accuracy of nursing diagnoses documentation, need to be distinguished. To support nurses in documenting their diagnoses accurately, we recommend taking a comprehensive perspective on factors that influence diagnoses documentation. A conceptual model of determinants that influence nursing diagnoses documentation, as presented in this study, may be helpful as a reference for nurse managers and nurse educators.

Relevance to clinical practice. This review gives hospital management an overview of determinants for possible quality improvements in nursing diagnoses documentation that needs to be undertaken in clinical practice.

Key words: literature review, nursing diagnosis, nursing documentation, nursing process

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Introduction

Accurate documentation of nursing diagnoses is vital to nurses in daily hospital practice. The aim of diagnoses documentation is to help nurses to correctly plan, intervene and evaluate nursing care for individuals and to accomplish optimal continuity of care and patient safety (Needleman & Buerhaus 2003).

Several authors have reported that patient records contain relatively few formulated nursing diagnoses, related factors

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and pertinent signs and symptoms (Björvell et al. 2002, Florin et al. 2005, Müller-Staub et al. 2007). Furthermore, the accuracy of nursing diagnoses documentation has been found to be moderate to poor (Ehrenberg et al. 1996, Moloney & Maggs 1999, Müller-Staub et al. 2006). Several studies have shown that the prevalence and accuracy of nursing diagnoses have an indirect impact on the decision-making processes and documentation of nurses (Brunt 2005, Banning 2007). The nurses’ decision-making process is determined by work procedures, allocation of work, disrupted working conditions and time pressures (Coiera & Tombs 1998, Björg & KIRKEVOLD 2000, Hedberg & Satterlund-Larsson 2004); doctors’ treatment orders, ward protocols and policies; conflicting personal values; and ‘knowing the patient’ (Radwin 1995, 1998, Bucknall & Thomas 1997, Bucknall 2000, Currey & Worrall-Carter 2001). Nurses’ daily documentation in the patient’s record is negatively influenced by several factors, such as being disrupted during documentation activities, nurses’ limited competence regarding documenting, lacking motivation to enter information into the patient record and receiving inadequate supervision (Cheevakasemsook et al. 2006). A positive influence on the documentation in the patient record is the use of electronic nursing process documentation systems (Ammenwerth et al. 2001). These studies evaluated the general impact of these factors on the decision-making process and the documentation process. However, how these various factors affect the prevalence and accuracy of nursing diagnoses documentation is less known. Thus, the aim of this review was to study the factors that determine the frequency and accuracy of nursing diagnoses documentation.

Background

In the 1970s, the nursing process was introduced into nursing educational programmes and hospital nursing practice worldwide as a systematic method of planning, evaluating and documenting nursing care (Gordon 1994). The nursing process facilitates problem solving, reflective judgement and decision-making, which in turn results in a desired outcome. Nurses are trained to document their knowledge and judgments explicitly according to the nursing process (Warren & Hoskins 1990, Lee et al. 2006). A central element of the nursing process is how nurses derive a nursing diagnosis based on clinical assessments, interviews and observations (Wilkinson 2007). In 1990, the North American Nursing Diagnosis Association (NANDA) defined nursing diagnosis as ‘a clinical judgement about individual, family, or community responses to actual or potential health problems/life processes’ (NANDA 2004). Diagnoses contain a problem label (P), a concise term or phrase that represents a pattern of related cues; an aetiology or related factors (E) and signs/symptoms (S). This diagnostic structure is known as the ‘PES structure’ (Gordon 1994). Nurses have to analyse a patient’s responses to health problems using interviews and observations. These analyses can be complex as there is a large variety in responses to illness and diseases (Müller-Staub et al. 2006).

Although nursing educators acknowledge the importance of developing skills in diagnostic reasoning, the majority of graduate and undergraduate programmes in nursing education do not focus on factors that affect reporting diagnostic inferences in the ward in daily practice (Smith Higuchi et al. 1999). From the mid 1990s, nurse researchers have increasingly studied factors that influence nursing diagnoses, such as education programmes and electronic documentation devices to improve diagnoses documentation (Kurashima et al. 2008). Evidence shows that educational programmes geared to improving diagnostic-reasoning skills significantly increase the prevalence and accuracy of documented nursing diagnoses (Björvell et al. 2002, Müller-Staub et al. 2006, Cruz et al. 2009, Saranto & Kinnunen 2009). Moreover, the development and implementation of electronic documentation resources and preformulated templates have been demonstrated to positively influence the frequency of diagnoses documentation (Smith Higuchi et al. 1999, Gunningberg et al. 2009).

The study

Aim

The aim of this study was to review what factors influence the prevalence and accuracy of nursing diagnosis documentation in hospital practice.

Methods

We conducted a systematic literature search of the electronic databases MEDLINE and CINAHL for relevant articles published between January 1995–October 2009. We used MeSH terms for the MEDLINE search and thesaurus terms for the CINAHL search. Four sets (I, II, III and IV) of search terms were used. The sets were subdivided into two groups: Sets I and III (MEDLINE) and sets II and IV (CINAHL) (Fig. 1). Our search returned 1032 titles. We applied the following inclusion criteria to the articles: (1) published in English, (2) primary research, (3) addressed factors influencing the prevalence and accuracy of the documentation of nursing diagnoses and (4) related to registered nurses.
Evidence, as published by the Centre for Evidence Based Medicine (2009), slight adaptations were made for research in nursing documentation. We used the updated version of the Oxford Levels of Evidence, as published by the Centre for Evidence Based Medicine (Phillips et al. 2009). Based on Müller-Staub et al. (2006), slight adaptations were made for research in nursing documentation with qualitative research methods. The following categories were used:

- **Level 1. Randomised trials**
- **Level 2. Cohort studies, cross-sectional designs, pretest/post-test designs, quasi-experimental designs, record reviews**
- **Level 3. Case-controlled studies**
- **Level 4. Observational studies, database research, qualitative interviews, systematic analyses of qualitative studies**
- **Level 5. Expert opinions**

Critical appraisal revealed that the design of most of the research papers included in our review did not employ the highest level of evidence. There were three Level 1 studies, 16 Level 2 studies, one Level 3 study and four Level 4 studies. We excluded Level 5 studies. The Level 1 studies were clinically relevant randomised studies. The Level 2 studies used a variety of designs and were described in papers examining nursing diagnoses documentation; these Level 2 studies used pretest/post-test designs, quasi-experimental designs, cross-sectional designs, exploratory study methods and record reviews. The Level 3 study was a case-controlled study.

**Figure 1** Database search.

in hospital practice. We excluded studies conducted in non-hospital environments or those involving nursing students and studies on diagnostic inferences in emergency room triage situations. Studies on the decision-making process or reasoning process were included only if a clear connection to nursing diagnoses documentation was described. Studies describing the validation or evaluation of measurement instruments or guidelines dealing with the accuracy of nursing diagnoses in patient records were included if influences on the documented nursing diagnoses were described. We excluded studies that discussed possible influencing factors without research-based evidence. We included 24 articles for full-text assessment. To assess the quality of the selected studies, we followed the meta-synthesis approach of Paterson et al. (2001).

While examining the included articles, two independent reviewers systematically abstracted the focus of the studies, design, sample size, data analysis and general and key findings concerning factors that influence the prevalence and/or accuracy of nursing diagnoses in patient records. In addition, two reviewers assessed the methodology used in each study. For instance, reports of randomised, controlled trials were assessed according to the recommendations of the Consolidated Standards of Reporting Trials (CONSORT) statement (Moher et al. 2001). For the assessment of reports of non-randomised studies, the Transparent Reporting of Evaluations with Non-randomised Designs statement was used (Des Jarlais et al. 2004). For cohort or case–control studies, Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) was applied (Vandenbroucke et al. 2007).

In our appraisal, we categorised each article according to the level of evidence contained in the article. For this purpose, we used the updated version of the Oxford Levels of Evidence, as published by the Centre for Evidence Based Medicine (Phillips et al. 2009). Based on Müller-Staub et al. (2006), slight adaptations were made for research in nursing or studies with qualitative research methods. The following categories were used:

**Figure 2** Search strategy and number of records identified through database search.

- **MEDLINE (Set I)**
  - n = 18
  - Excluded: Published 1995 to October 1, 2009 n = 454
    - Non-English language n = 173
    - Nursing students/professions other than nurses n = 21
    - Non-hospital settings/triage settings n = 51
    - Influences on reasoning/decision making/attitudes n = 122
    - Validation and/or evaluation of instruments and guidelines n = 93
    - Level of evidence: 5 n = 55
  - Set I & Set III
  - After duplicates removed n = 66

- **CINAHL (Set II)**
  - n = 9
  - Excluded: n = 55
    - Papers excluded based on title and abstract n = 969
  - Set II & Set IV
  - After duplicates removed n = 615

- **MEDLINE (Set III)**
  - n = 556
  - Papers excluded based on title and abstract n = 969

- **CINAHL (set IV)**
  - n = 613
  - Papers excluded based on full-text analysis n = 39

- **Analysis of full text**
  - n = 63

- **Total papers included**
  - n = 24

- **Set I, II, III and IV after duplicates removed n = 1032**
Factors influencing the prevalence and accuracy of nursing diagnoses

The nurse as a diagnostician

In the literature, we identified four sub-themes related to the individual nurse as a diagnostician as a factor that influences the prevalence and accuracy of nursing diagnoses documentation: (1) attitude and disposition towards diagnosis, (2) diagnostic experience and expertise, (3) case-related and diagnostic knowledge and (4) diagnostic reasoning skills.

The attitude or disposition of nurses towards nursing diagnoses and the critical-thinking approach of nurses may influence the way they document diagnostic findings. Based on the findings of Armitage (1999) and Hasegawa et al. (2007), it seems that nurses do not examine how they should reflect on their critical-thinking approach and their diagnostic findings in clinical practice. Smith Higuchi et al. (1999) suggest that to be able to document diagnoses accurately and to perform at satisfactory levels of diagnostic competency, nurses may have to learn how to examine their critical-thinking disposition in areas such as open-mindedness. The development of such disposition can be explored by providing a formal education programmes in hospital practice, because nurses do not document nursing diagnoses on their own initiative (Smith Higuchi et al. 1999).

In hospital practice, the degree of nurses’ experience in diagnosing significantly and positively influences the accuracy of nursing diagnoses documentation (Reichman & Yarandi 2002, Hasegawa et al. 2007). Using a qualitative research approach, Armitage (1999) and Axelsson et al. (2005) also reported that diagnostic experience positively influences the prevalence of accurate diagnoses. Several factors affect nurses’ knowledge and experience: the presence of case-related knowledge and reasoning skills acquired in formal education programmes (Smith Higuchi et al. 1999); the motivation to learn diagnostic tasks (Whiteley & Gulanick 1996); and the frequency of studying diagnostics (Hasegawa et al. 2007, Cruz et al. 2009).

Diagnostic education and resources

From the included articles, we extracted five educational or resources-related sub-themes that influence the accuracy of nursing diagnosis documentation: (1) guided clinical reasoning, (2) nurses’ educational background in nursing process application, (3) prestructured record forms, (4) implementation study. The Level 4 studies used qualitative interview methods and qualitative descriptive designs, representing more than expert opinion. The Level 1, 2 and 3 studies used adequate sample sizes and an acceptable reference standard/clinical decision rule. Based on the quality analysis, 24 articles were included for further analysis.

Next, we performed an in-depth analysis of the papers’ contents using the approach of Paterson et al. (2001) and Cooper (1998), where papers were re-read purposively to identify influencing factors. To categorise the factors influencing the prevalence and accuracy of nurses’ diagnoses documentation, two reviewers qualitatively structured the factors independently into ‘themes’. To compose a more distinct categorisation of influencing factors, the reviewers compared and discussed their themes until they reached consensus. The consensus discussions enabled us to construct a categorisation of domains, which in turn enabled us to present a conceptual framework of determinants that influence the prevalence and accuracy of nursing diagnoses, as described in the literature.

Reliability and validity

We identified various instruments previously used to measure factors that influence the prevalence and accuracy of nursing diagnoses documentation: the Cat-ch-Ing instrument (Björvell et al. 2002, Darmer et al. 2006); the PES format of Gordon (1976) (Thoroddsen & Thorsteinsson 2002, Thoroddsen & Ehnfors 2006); the Quality of Nursing Diagnoses (QOD) (Florin et al. 2005); the Scale for Degrees of Accuracy compiled by Lunney (2001) (Kurashima et al. 2008, Cruz et al. 2009); and the Quality of Nursing Diagnoses Interventions and Outcomes (Q-DIO) (Müller-Staub et al. 2006). These studies reported aspects of content validity and reliability. Inter-rater reliability outcomes were described for all of the aforementioned instruments. Reported over all inter-rater reliability scores were 0.61 or higher and therefore, according to Fleiss et al. (2003), acceptable.

All the aforementioned instruments included the PES structure as the theoretical basis for quantifying accuracy of diagnoses, even though the PES structure was used in various scoring ranges and scales. In studies that used questionnaires in surveys, validity and reliability were often unclear or not mentioned at all.

Results

We included 24 articles that examined factors that influence the prevalence and accuracy of nursing diagnoses documentation. Four domains were identified: (1) the nurse as a diagnostician, (2) diagnostic education and resources, (3) complexity of a patient’s situation and (4) hospital policy and environment. These four themes were subdivided into 18 sub-themes that influence diagnoses documentation (Fig. 3).
of classification systems, such as NANDA and (5) computer-generated care plans and patient records.

Nursing process education (Björvell et al. 2002, Florin et al. 2005 Cruz et al. 2009) and guided clinical reasoning (Müller-Staub et al. 2006, 2008) are examples of educational programmes for registered nurses which intended to improve the accuracy of diagnoses documentation significantly. Consistent theoretical teaching and practical training in ongoing educational programmes may offer procedural and conceptual knowledge as a basis for accurate diagnostic documentation (Müller-Staub et al. 2006, Cruz et al. 2009).

Educational programmes related to patient populations are needed to educate nurses on how to derive and report diagnoses in the actual hospital information structure where they work (Darmer et al. 2006). Educational programmes intended for both novice and experienced nurses can give both the opportunity to reflect on how to document diagnoses in the present hospital environment of their own ward (Kawashima & Petrini 2004, Turner 2005). This approach has a significant positive effect on the accuracy of nursing diagnoses documentation (Björvell et al. 2002, Lee 2005, Müller-Staub et al. 2006). Resources that reduce the lack of clarity in diagnostic statements – for instance, specific computer-generated standardised nursing care plans – may support nurses in their administrative work (Smith Higuchi et al. 1999). Kurashima et al. (2008) found that the time...
needed to derive a diagnosis was significantly shorter when nurses used a computer aid. Classification structures, e.g., NANDA-I classification (Thoroddsen & Ehnfors 2006) and new forms for recording in the PES format (Florin et al. 2005, Darmer et al. 2006) in combination with applicable electronic resources facilitate more accurate diagnoses documentation (Smith Higuchi et al. 1999).

Complexity of a patient’s situation

Factors that indicate the complexity of a patient’s situation in clinical practice may influence the accuracy of the nursing diagnosis documentation. These factors, as the current literature indicates, can be categorised into three themes: (1) cultural differences in expressing patients’ needs, (2) patients’ severe medical diagnosis in specialty areas and (3) patients’ way of expressing severe diagnoses.

Kilgus et al. (1995) and Hamers et al. (1996) stated that, especially in complex patient situations or in specialty areas, it is important for nurses to be aware of their subjectivity in diagnostic judgements and to develop mental abilities that reflect this subjectivity. Hamers et al. (1996) showed in a study of newborns that nurses attributed the highest pain score to a child when the medical diagnosis was severe and the child vocally expressed his/her pain. On the basis of a score to a child when the medical diagnosis was severe and (1995) found significant cultural differences in the discharge diagnoses of adolescents hospitalised for psychiatric disorders. The authors of this study pointed out that some of these differences may reflect ethnocentric clinician bias in the diagnostic assessment of youths with different cultural backgrounds.

There may be an association between length of stay, severe medical diagnosis in specialty areas and complexity of the patient situation, as Thoroddsen and Thorsteinsson (2002) suggested, although, based on the results of their study, this association was not clear. Nevertheless, length of stay seems to be an influencing factor with respect to the number of documented diagnoses, as was reported by Thoroddsen and Thorsteinsson (2002).

In complex patient situations nurses’ confidence in the diagnostic task in cases of severe diagnoses, interpretation difficulties of cues and difficulties in analysing diagnoses in specialty areas are factors influencing nursing diagnosis documentation as well (Whitley & Gulanick 1996, Armitage 1999).

Hospital policy and environment

We identified six sub-themes concerning the influence of the hospital environment on nursing diagnoses: (1) the number of patients per nurse, (2) nurses’ workload level and time to spend on diagnostic tasks, (3) the use of a medical model, (4) the number of administrative tasks nurses have to carry out, (5) physicians’ disposition towards nursing diagnoses and (6) the information structure used in the ward.

The medical-situational context appears to be one of the important factors that influences the prevalence and accuracy of nursing diagnoses documentation. According to Griffiths (1998), the way nurses process the diagnostic opinions of physicians is a factor that influences how nurses document their own diagnostic findings. Nurses appear to adopt medical language instead of nursing language. Physicians’ objections or rejections toward the implementation of nursing diagnoses, as mentioned by (Whitley & Gulanick 1996), can obstruct, or at least hinder the implementation of nursing education courses or resource innovations in documentation.

Martin (1995) and Paganin et al. (2008) identified the number of administrative tasks, lack of administrative support, lack of time and workload level as the main barriers nurses face when documenting nursing diagnoses. One possible measure providing administrative support is the implementation of a prestructured information approach, because prestructuring information by using, for instance, prestructured care plans or schemes appears to be helpful (Björvell et al. 2002, Brannon & Carson 2003, Müller-Staub et al. 2006).

Discussion

Factors that influence diagnoses documentation

We identified four themes that characterise factors that influence the prevalence and accuracy of nursing diagnoses documentation. However, our review of the literature failed to identify arguments distinguishing major and minor factors of influence. It seems that each domain comprises important influencing factors.

Different designs and sample sizes were used in various studies; however, no major contradictions in outcomes were found. We found representative record reviews that reported factors influencing diagnoses documentation: 1103 charts (Thoroddsen & Thorsteinsson 2002); 427 charts (Smith Higuchi et al. 1999); 352 records (Kilgus et al. 1995); 225 records (Müller-Staub et al. 2006); and 600 journals (Darmer et al. 2006). We found results from qualitative research to be comparable to those obtained from quantitative methods. For instance, both Armitage (1999) and Reichman and Yarandi (2002) arrived at the same conclusion—nurses’ experiences as an important factor that influences the accuracy of nursing diagnoses documentation—
even though the former study was based on in-depth interviews of 10 nurses and the latter was based on analysis of 184 written patient simulations.

We only included studies that had examined nursing diagnosis documentation as a research topic. In our analyses, however, we distinguished two classes of factors that influence nursing documentation: (1) general factors, which influence the reasoning and documentation process in general; and (2) specific factors, which specifically influence the prevalence and accuracy of nursing diagnoses documentation, as stated in a conceptual framework (Fig. 3), which is based on the influencing factors mentioned in the included papers (Table 1). Examples of general factors that influence nursing decision-making procedures and documentation include work procedures, allocation of work, disrupted work conditions, conflicting personal values, knowing the patient, motivation and staff development. The differentiation of general versus specific factors that influence diagnoses documentation may have common characteristics that need to be investigated more intensely, because the terms used in the literature denote subjective notions. For example, a clear and uniform definition or consistent description of the meaning of ‘knowing the patient’, ‘intuition’, ‘motivation’, ‘inadequate staff development’ was not found. As a result, a comprehensible description of activities that disrupt nurses as they document diagnoses was missing. Also missing was information about the background of conflicting personal values. We hypothesise that there might be several underlying issues that influence nurses’ decision-making and diagnoses documentation. These issues need to be investigated in more depth in future research.

With regard to specific factors that influence diagnoses documentation, we hypothesise that the influencing factors positioned in the four domains may be inter-related. For instance, the knowledge of individual nurses partly depends on education programmes provided in hospital practice. The provision of these programmes depends on a hospital’s policy on offering educational courses and resources. These courses and resources may only be successful if there are restrictions in workload, clear diagnostic expectations regarding documenting accurate nursing diagnoses and interdisciplinary support to give nurses the opportunity to learn and to carry out their diagnostic tasks. Consequently, we assume that a single innovation, such as an education programme dealing with diagnostics or a computerised care plan, without taking other factors that influence diagnoses documentation into account, may not be as effective as it could be in the long term.

The distinction between medical diagnoses and nursing diagnoses appears to be unclear for both physicians and nurses (Whitley & Gulanick 1996). Therefore, healthcare professionals may not fully accept a nurse’s responsibility to make diagnoses. Still, in general, there may be no interdisciplinary agreement on what an accurate nursing diagnosis is and what it is not. In hospital practice, nurses usually do not perceive a sharp distinction between ‘diseases’ and ‘levels of wellness’ (Bandman & Bandman 1995, Hasegawa et al. 2007).

Being unfamiliar with the nursing diagnosis domain and the diagnostic language used by nurses may lead to uncertainties and misunderstandings both for nurses and physicians. In contrast, knowledge and a positive attitude towards the use of diagnoses by nurses, physicians and the hospital administration may stimulate nurses to derive accurate diagnoses (Whitley & Gulanick 1996, Björvell et al. 2002). Reducing the nurse-to-patient ratio and limiting additional administrative tasks to give nurses enough time to accomplish their diagnostic tasks creates limits in the hospital environment and will give nurses the notion that hospital management supports them in their diagnostic responsibilities. Nurses’ impression of the hospital policy in the case of diagnostic tasks may sometimes reflect their motivation for learning how to document and for documenting nursing diagnoses (Whitley & Gulanick 1996).

In the ‘nurse as a diagnostician’ context, Hamers et al. (1996) and Shapiro (1993) found that nurses’ perceptions or misperceptions of a newborn’s pain affected how much analgesics they gave the newborn. This observation suggests that nurses’ ‘misperceptions’ could affect their diagnoses and ultimately the amount of medication dispensed. Indeed, in the Hamers et al. (1996) and Shapiro (1993) studies, nurses’ ‘misperceptions’ caused newborns to receive inadequate pain medication. Research on nurse’s interpretation and judgement of frequently documented or severe diagnoses, such as pain, is rare, and further research is required.

Educational programmes, as suggested by Müller-Staub et al. (2006) and Cruz et al. (2009) that focus on recognising the signs and symptoms of severe diagnoses may help nurses to avoid diagnostic misperceptions, as education in diagnostic documentation skills can enhance the quality of documented nursing diagnoses. Higher quality of diagnoses documentation correlates with qualitative improvements in the documentation of nursing-sensitive patient outcomes, as mentioned in the implementation study of Müller-Staub et al. (2007). However, studies discussing the possible effects of education programmes intended for accurate diagnostic documentation in terms of patient safety and quality of care are lacking and may be needed as well (Lunney 2007).
<table>
<thead>
<tr>
<th>Reference</th>
<th>Focus</th>
<th>Research design/level of evidence (LE)</th>
<th>Data collection/sample size</th>
<th>Key findings</th>
<th>Factors that influence diagnoses</th>
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<tbody>
<tr>
<td>Armitage (1999)</td>
<td>The nursing assessment of respiratory distress in infants by children’s nurses</td>
<td>Cross-sectional design using qualitative interviews and a survey LE: 4</td>
<td>Qualified children’s nurses (n = 10) completed questionnaires and partook in qualitative interviews</td>
<td>Nurses’ assessment was influenced by the medical model The concept ‘nursing diagnosis’ was poorly understood</td>
<td>Medical model Nurses’ diagnostic experience</td>
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<td>Axelsson et al. (2005)</td>
<td>Incentives for using nursing diagnoses in clinical practice</td>
<td>Qualitative, descriptive design LE: 4</td>
<td>Qualitative interviews of registered nurses (n = 12)</td>
<td>Incentives for using nursing diagnoses originated from effects generated from performing a deeper analysis of the patient’s nursing needs</td>
<td>Motivation to provide individual and holistic nursing care Experiencing that diagnoses facilitate decisions in terms of actions Recorded nursing diagnoses perceived as time saving Experiencing that diagnoses facilitate evaluation of nursing care Support from the management in using diagnoses</td>
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<td>Bjorvell et al. (2002)</td>
<td>Long-term effects of a nurse-documentation intervention</td>
<td>Quasi-experimental longitudinal design LE: 2</td>
<td>A 2-year intervention composed of theoretical training, supervision, exchange of information during conferences, and organisational support regarding nursing documentation based on the Swedish VIPS Model, followed by a record review of 269 records in three acute-care wards in one hospital using the Cat-ch-Ing instrument</td>
<td>A comprehensive intervention of nursing documentation significantly improved the quality of nursing diagnoses documentation in the short term and the long term</td>
<td>Theoretical training in documentation of diagnoses Individual supervision and support Information exchange Development of structured forms and standardised care plans</td>
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<td>Brannon and Carson (2003)</td>
<td>The influence of nursing expertise and information structure on certainty of diagnostic decision-making</td>
<td>Quasi-experimental/ case-controlled design LE: 3</td>
<td>Nurses (experts), student nurses (novices), and non-nurse (naive) participants ($n = 216$) read patient scenarios either high in information structure or low in information structure and rated their certainty about what the potential diagnosis might be. Afterwards, each participant was asked to generate a diagnosis and rate their level of confidence in their own diagnosis from 0–100%</td>
<td>By using pre-existing cognitive schemata for processing patient information, participants were more certain about their decision-making when using structured information than they were about using unstructured information</td>
<td>Nurses’ diagnostic expertise Use of structured information</td>
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<td>Cruz et al. (2009)</td>
<td>Continuing education courses related to critical thinking and clinical reasoning</td>
<td>Pretest/post-test design LE: 2</td>
<td>Nurses completed a pretest and a post-test consisting of two written case studies designed to measure the accuracy of nurses’ diagnoses ($n = 39$)</td>
<td>Significant differences were found in accuracy on the pretest and the post-test because of the education courses related to critical thinking and clinical reasoning</td>
<td>Continuing education courses (16 hours) related to critical thinking and clinical reasoning</td>
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<td>Darmer et al. (2006)</td>
<td>Nurses’ adherence to the VIPS model, a systematic method of nursing documentation to improve the accuracy of the nursing report</td>
<td>Longitudinal retrospective nursing journal review LE: 2</td>
<td>Nursing documentation (journals, $n = 50$) of four departments were randomly selected and audited annually for 3 years using the Cat-ch-Ing instrument ($n = 600$)</td>
<td>Nursing documentation improved significantly during the course of the study</td>
<td>A pragmatic approach: reversed ‘problems’ and consequences and reduced diagnostic statements to problem, aetiology, description of signs and symptoms in the nursing status</td>
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<td>Florin et al. (2005)</td>
<td>Effects of education on the nursing process and implementation of new forms for recording on the quality of nursing diagnostic statements in patient records</td>
<td>Pretest/post-test design LE: 2</td>
<td>The intervention consisted of a 3-hour, five-meeting educational programmes Randomly selected patient records were reviewed before and after the intervention Data analyses using a measurement scale with 14 characteristics pertaining to nursing diagnoses named: quality of nursing diagnosis used in two experimental units (n = 70) and one control unit (n = 70)</td>
<td>Quality of nursing diagnostic statements improved significantly in the experimental units, whereas no improvement was found in the control unit Education in the nursing process and implementation of new forms for recording might improve RNs’ skills in expressing nursing diagnoses</td>
<td>Implementation of new forms for recording Education in the nursing process</td>
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<td>Griffiths (1998)</td>
<td>Description of patients’ problems by nurses using two different needs-based nursing models</td>
<td>Qualitative, descriptive study design and literature review LE: 4</td>
<td>Two wards were investigated in one hospital; Ward A used the nursing model of Roper Logan and Tierney (1980), whereas Ward B used the model of Dorothea Orem (1980) Data collected were subjected to content analysis using Gordon’s Functional Health Patterns to order the data</td>
<td>Nurses most commonly used medical diagnoses or the medical reasons for admission Patients’ problems identified predominately addressed biopsychical needs</td>
<td>Medical diagnoses Medical reasons for admission</td>
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<td>Gunningberg et al. (2009)</td>
<td>The quality and comprehensiveness of nursing documentation of pressure ulcers before and after implementation of an electronic health record and the use of preformulated templates for pressure ulcer recording</td>
<td>Cross-sectional retrospective review of health records LE: 2</td>
<td>Analysis of recorded data on pressure ulcers Paper-based records (n = 59) identified by notes on pressure ulcers and electronic health records (n = 71) with pressure ulcer recordings were retrospectively reviewed</td>
<td>Electronic patient records showed significantly more diagnostic notes on pressure ulcer grade</td>
<td>Preformulated templates in electronic health records</td>
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<td>Reference</td>
<td>Focus</td>
<td>Research design/level of evidence (LE)</td>
<td>Data collection/sample size</td>
<td>Key findings</td>
<td>Factors that influence diagnoses</td>
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<td>Hamers et al. (1996)</td>
<td>The influence of task-related factors on nurses’ pain assessments and decisions regarding interventions</td>
<td>Randomised experimental design LE: 1</td>
<td>Paediatric nurses (n = 202) from 11 hospitals were randomised into four groups Each group was exposed to four sequential cases, each of which consisted of a vignette and a videotape with different factors The child’s expressions were operationalised via videotapes of the same child Data collection took place during 15-minute sessions based on vignettes; nurses rated their answers on a visual analogue scale</td>
<td>Paediatric nurses attributed more pain to and were more inclined to administer non-narcotic analgesics to children who vocally expressed their pain than to children who were less expressive Nurses also attributed the most pain to a child when the diagnosis was severe</td>
<td>Vocally expressing pain Severe medical diagnosis</td>
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<td>Hasegawa et al. (2007)</td>
<td>Nurses’ diagnostic competencies by using written case studies and the factors influencing these competencies</td>
<td>Cross-sectional study design based on written case studies LE: 2</td>
<td>Two written case studies were used to measure the diagnostic competencies of the subjects A convenience sample of 376 nurses practicing in medical-surgical nursing positions was obtained from nine different hospitals Data were abstracted from vignettes; nurses rated their answers on a visual analogue scale</td>
<td>Japanese nurses in the sample, in general, did not perform satisfactory levels of diagnostic competency</td>
<td>Length of clinical experience Decision-making responsibility Frequency of studying nursing diagnosis</td>
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<tr>
<td>Kilgus et al. (1995)</td>
<td>Influence of race on diagnoses</td>
<td>Record review LE: 2</td>
<td>Data were abstracted from patients’ records and nursing incident reports DSM-III-R discharge diagnoses were assigned to five non-mutually exclusive groups Hospital medical records (n = 352); whites (n = 251), African Americans (n = 101) in one hospital</td>
<td>Significant racial differences were found in the discharge diagnoses of adolescents hospitalised for psychiatric disorders Organic/psychotic diagnoses were much more frequent in African Americans, whereas whites were almost twice more likely to receive mood/anxiety diagnoses Substance abuse was more often diagnosed in whites Some of these differences may reflect ethnocentric clinician bias in the diagnostic assessment of youths from different cultural and racial backgrounds</td>
<td>Racial differences in patients Cultural backgrounds in patients</td>
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<td>Kurashima et al. (2008)</td>
<td>Whether a computer-aided nursing (CAN) diagnosis system improves diagnostic accuracy and efficiency</td>
<td>Randomised crossover trial LE: 1</td>
<td>Registered nurses ($n = 42$) were divided into groups: one using the CAN diagnosis system and the other using a handbook of nursing diagnosis. Degree of accuracy was judged by using Lunney’s seven-point interval scale, while efficiency was evaluated according to the time required for diagnosis.</td>
<td>No significant difference was found between the two groups in terms of diagnostic accuracy. Time required for diagnosis was significantly shorter for subjects who used the CAN diagnosis system than for those who did not.</td>
<td>Using a computer aid significantly shortens the time needed to derive diagnosis.</td>
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<td>Lee (2005)</td>
<td>Factors that may affect nurses’ use of nursing diagnoses in charting standardised nursing care plans in their daily practice</td>
<td>One-on-one, in-depth interviews LE: 4</td>
<td>Clinical nurses ($n = 12$) at a medical centre underwent one-on-one, in-depth interviews. Data analysis was based on Miles and Huberman’s (1994) data reduction, data display, and conclusion-verification process to investigate the charting process.</td>
<td>Nurses do not regularly use objective data to record patients’ condition.</td>
<td>Use of standardised care plans.</td>
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<td>Martin (1995)</td>
<td>The independent nursing role of nurse practitioners (NPs) and the advantages and barriers of using nursing diagnosis in NP practice</td>
<td>Cross-sectional study design based on a survey LE: 2</td>
<td>Self-administered questionnaires ($n = 181$) included biographical data and forced choice questions about knowledge of nursing diagnosis.</td>
<td>No statistical significance was seen between NPs’ knowledge and use of nursing diagnoses and their educational background, specialty, years of practice as a NP, and practice setting. 85% of NPs’ surveyed reported they did not use nursing diagnoses in their clinical practice.</td>
<td>Lack of time, Lack of clarity of diagnostic statements, Lack of administrative support for writing nursing diagnosis.</td>
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<tr>
<td>Müller-Staub et al. (2007)</td>
<td>Evaluation of the effects of the Nursing Diagnostics Educational Programme (NDEP)</td>
<td>Pretest/post-test design LE: 2</td>
<td>Nurses of hospital wards ($n = 12$) of one hospital received an educational intervention called NDEP. Before and after the intervention, a total of 72 randomly selected nursing records were evaluated. The instrument Quality of Nursing Diagnoses, Interventions, and Outcomes was used to measure the quality of the nursing diagnoses.</td>
<td>The guided clinical reasoning programme significantly improved the formulation of nursing diagnostic labels and identification of signs/symptoms and correct aetiologies. Post-test data showed almost no nursing diagnoses without signs/symptoms in comparison with the pretest.</td>
<td>NDEP, Guided clinical reasoning.</td>
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<td>Müller-Staub et al. (2008)</td>
<td>The effect of guided clinical reasoning on nursing diagnoses, interventions, and outcomes</td>
<td>Cluster-randomised controlled experimental study in a pretest/post-test design LE: 1</td>
<td>Nurses from three wards received guided clinical reasoning training Nurses of three other wards participated in classic case discussions and functioned as a control group The quality of 225 randomly selected nursing records, containing 444 documented nursing diagnoses corresponding to interventions and outcomes, was evaluated by applying 18 Likert-type items of the Q-DIO</td>
<td>The mean scores of nursing diagnoses increased significantly in the intervention group Guided clinical reasoning led to significantly higher quality of nursing diagnosis documentation to aetiology-specific interventions and to enhance nursing-sensitive patient outcomes In the control group, the quality of the diagnoses was not significantly changed</td>
<td>Guided clinical reasoning</td>
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<td>Paganin et al. (2008)</td>
<td>The impact of institutional, professional and personal factors on nurses and on their efforts to derive nursing diagnoses</td>
<td>Cross-sectional study design based on a survey LE: 2</td>
<td>Responses of 21 nurses for each group of factors (institutional, personal, and professional) were evaluated and scored on a scale of 0 (none of the impact parameters identified) to 100 (all impact parameters) Data were collected using a closed, structured questionnaire during the work shift of 21 nurses</td>
<td>The professional factor scores were significantly lower among nurses with previous theoretical training in nursing diagnosis compared to those with no previous theoretical training The recognition of these factors and improved institutional support may facilitate the implementation of nursing diagnoses</td>
<td>Workload level Number of patients per nurse Number of administrative tasks Previous nursing diagnosis experience Previous theoretical training</td>
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<td>Reichman and Yarandi (2002)</td>
<td>Diagnostic cue utilisation between expert and novice critical care cardiovascular nurses (CCCV)</td>
<td>Experimental design LE: 2</td>
<td>Five written patient simulations (WPSs) served as instruments in the study Verbal recalls of the respondents were audio taped for analysis; expert (n = 23) and novice (n = 23) nurses were tested</td>
<td>Of the 184 WPSs that were diagnosed, 88 were accurate Of the 88 accurate diagnoses, 63 (72%) were made by CCCV nurse experts, while 25 (28%) were made by nurse novices</td>
<td>Level of experience Nurses’ background as an expert</td>
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<td>Smith Higuchi et al. (1999)</td>
<td>Factors associated with nursing diagnosis utilisation</td>
<td>Cross-sectional study design based on a survey and a retrospective chart review LE: 2</td>
<td>Attitude survey included 47 Likert-scale items and 2 open-ended questions All nurses (n = 65) from four hospitals that cared for patients with respiratory conditions were invited to participate in the study In addition, a retrospective chart audit of discharged patients (n = 427) was conducted</td>
<td>In two hospitals in which nursing diagnosis implementation programmes was not implemented, none of the 22 nurses documented nursing diagnoses In the two hospitals in which nursing diagnosis was formally implemented through hospital educational programmes, 37 of 43 nurses (86%) documented nursing diagnoses</td>
<td>Attitude towards diagnosis utilisation Knowledge Nursing administration expectations Presence of formal hospital educational programmes in nursing diagnostics Computer-generated nursing care plans</td>
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<td>Takahashi et al. (2008)</td>
<td>Difficult and easy aspects of performing the different stages of the nursing process according to the reports of nurses</td>
<td>Cross-sectional study design based on a survey LE: 2</td>
<td>Eighty-three nurses from 20 different hospital units in which the nursing process was regularly implemented answered structured research questionnaires</td>
<td>Nurses had most difficulties with the phases nursing diagnoses and evaluations Most of the difficult and easy aspects reported were related to the nurses' theoretical and practical knowledge needed to perform the phases of the process</td>
<td>Lack of theoretical knowledge Lack of practical exercise</td>
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<td>Thoroddsen and Ehnfors (2006)</td>
<td>Differences in documented nursing diagnoses, signs and symptoms and aetiological factors before and after an educational effort</td>
<td>Pretest, post-test, cross-sectional study design LE: 2</td>
<td>For the pretest, 355 nursing records in a hospital were reviewed After the implementation of the Functional Health Patterns for assessment documentation and the NANDA classification for nursing diagnoses, a post-test was conducted in which 349 records were reviewed</td>
<td>The number of diagnoses per patient increased, incomplete diagnoses decreased along with the use of medical diagnoses, and the documentation of signs and symptoms increased</td>
<td>Implementation of the NANDA classification for nursing diagnoses</td>
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<td>Thoroddsen and Thorsteinsson (2002)</td>
<td>Expressions or terms used by nurses to describe patient problems</td>
<td>Retrospective chart review LE: 2</td>
<td>The patient records in 1103 charts from a 400-bed acute-care hospital were analysed</td>
<td>Nurses failed to document the problems of patients in about 40% of the records</td>
<td>Patient length of stay is associated with the number of diagnoses</td>
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<td>Title: Nursing diagnosis taxonomy across the Atlantic Ocean; congruence between nurses’ charting and the NANDA taxonomy</td>
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<td>Nursing diagnoses statements ($n = 2171$) in charts were analysed based on the PES format</td>
<td>The NANDA taxonomy seems to be culturally relevant for nurses in different cultures</td>
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<td>Whitley and Gulanick (1996)</td>
<td>The current status regarding utilisation of nursing diagnosis and the interest in educational consultation sessions that were provided by the nursing diagnosis council</td>
<td>Cross-sectional study design based on a survey LE: 2</td>
<td>A survey instrument was mailed to all hospitals ($n = 239$) in the state of Illinois, USA</td>
<td>Nursing diagnoses were performed in 109 of the 139 responding hospitals</td>
<td>Limited ongoing education Lack of motivation to learn Difficulties in using diagnoses in specialty areas Physician objections or resistance</td>
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<td>Title: Barriers to the use of nursing diagnosis language in clinical settings</td>
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<td>The survey instruments were completed and returned by 139 agencies</td>
<td>Of the 109 respondents who performed nursing diagnoses, 88% included nursing diagnosis in an orientation programme, and almost all used NANDA terminology (95%)</td>
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</table>

NANDA, North American Nursing Diagnosis Association.
Limitations
The present review is limited in several respects. We only included papers published in English. Therefore, we focused more on papers written by authors who carried out their research in the North American and north-western European context. Despite the advanced literature search, we may have overlooked some papers because of the search strategy or database filters used. We assessed papers qualitatively. No statistical procedures to aggregate data were used, as the instruments and methods described in the reviewed articles differed. Therefore, it was not feasible to perform statistical procedures on the aggregated data.

Conclusion
Despite the lack of knowledge about factors that influence diagnoses documentation, we conclude that nursing diagnosis documentation is not limited to classification in an autonomous nursing domain but is limited to inference to an individual process influenced by several internal and external factors (Bandman & Bandman 1995, Wilkinson 2007). The outcomes of an individual diagnostic process ought to be documented by nurses in such a way that patients, colleagues, physicians and other healthcare workers can understand it and can rely on the content of the documentation. Also lacking is research about the influences of interdisciplinary exchange of knowledge concerning the essentials of medical and nursing diagnosis. Moreover, there might be an association between a nurse’s level of education, nurse staffing in hospitals and accuracy in diagnostic documentation. However, this possible association is still unclear and needs to be researched.

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Contributions
Study design: WP, RN, WS, CS; data collection and analysis: WP, RN and manuscript preparation: WP, RN, CS, WS.

Conflict of interest
Brink& Research and Development Association, Utrecht, the Netherlands financially funded the study and had no role in study design, in the collection, analyses and interpretation of data, in the writing of the report or in the decision to submit the paper for publication.

References
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