

Cross-Cultural Adaptation of the Quality of Diagnoses, Interventions and Outcomes (Q-DIO) Instrument into Brazilian Portuguese

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PURPOSE: To describe the cross-cultural adaptation of the Quality of Diagnoses, Interventions and Outcomes instrument into Brazilian Portuguese.

METHOD: This process entailed translation, synthesis, back-translation, expert committee review, and pretesting.

FINDINGS: Six items were altered in the Brazilian version, and the scoring system was changed from a five-point to a three-point Likert-type scale. Pretesting was conducted on a sample of 40 randomly selected nursing records. Overall reliability as measured by Cronbach's alpha was 0.96.

CONCLUSIONS: Adaptation resulted in a preliminary version of the instrument. **IMPLICATIONS FOR NURSING PRACTICE:** Assessment of the psychometric properties of the instrument in a larger sample of nursing records is required, and such a study is underway.

Introduction

The quality of nursing records and the use of nursing taxonomies and electronic health records may be directly related with quality of patient care (Linch, Müller-Staub, & Rabelo, 2010; Müller-Staub, Lavin, Needham, & van Achterberg, 2006; Müller-Staub, Needham, Odenbreit, Lavin, & van Achterberg, 2008; Saranto & Kinnunen, 2009). However, health professionals should improve upon patient care according to the nursing process and use standardized terminology to increase patient safety and improve documentation (Häyrinen, Lammintakanen, & Saranto, 2010).

Recording patients' problems, complaints, signs and symptoms or related factors, and responses is part of the nursing process. Precise records give nurses the ability to evaluate outcomes in response to nursing diagnoses and interventions; therefore, when retrospective records are available, one may evaluate progress of the care plan (Paans, Sermeus, Nieweg, & van der Schans, 2010). Conversely, failure to keep proper records and document the nursing process may lead to negative outcomes, jeopardizing the efficacy of care and patient well-being (Needleman

& Buerhaus, 2003). Use of a standardized terminology to describe clinical manifestations experienced by patients, diagnoses made, and interventions performed contributes to consistency in patient management and enables evaluation of outcomes by the care team. On the other hand, absence of a standardized methodology encourages incomplete record keeping, which can pose a patient safety hazard (Tiffany, Kelley, Brandon, & Docherty, 2011).

Studies show that relatively few of the diagnoses contained in nursing records are formulated with pertinent signs, symptoms, or related factors, and that nursing interventions and outcomes are rarely documented in detail. However, a lack of accuracy in interpretation can be related to a lack of supporting data even when documentation is available (Müller-Staub, Needham, Odenbreit, Lavin, & van Achterberg, 2007; Saranto & Kinnunen, 2009). In Brazil, most health facilities keep paper-based records and do not use standardized classifications (Santos, de Paula, & Lima, 2003). Studies have shown that use of the nursing process coupled with a classification system encourages more thorough record keeping at every stage of care. Electronic systems are superior to paper-based records in that they

remind nurses of which items should be filled out; furthermore, electronic records provide more adequate support for establishing and recording diagnoses, outcomes, and interventions (Linch et al., 2010; Odenbreit, Müller-Staub, Brokel, Avant, & Keenan, 2012; Tiffany et al., 2011).

A study conducted at a general hospital to evaluate which steps of the nursing process are carried out in clinical practice (Pokorski, Moraes, Chiarelli, Costanzi, & Rabelo, 2009) revealed that nurses justify certain issues as intervening with the nursing process. The authors report that nursing professionals have restricted knowledge of all stages which interfere with the nursing process; that nursing schools provide deficient instruction in assessment of signs and symptoms/related factors; and that technical and bureaucratic activities are prioritized to the detriment of the nursing process. This lack of commitment to the nursing process during nursing education hinders later use of the nursing process and documentation of care with standardized nursing terminologies. These results suggest that implementation of electronic health records, which connect all stages of the nursing process, could be beneficial (Odenbreit et al., 2012; Pokorski et al., 2009).

Regardless of the means of implementation of the nursing process, whether by paper-based or electronic health records, evidence-based nursing practice suggests that the nursing documentation should be assessed to evaluate the effectiveness of patient care. However, there is no single, internationally accepted gold standard for measurement of the precision of nursing records.

Researchers have developed the *Quality of Diagnoses, Interventions and Outcomes* (Q-DIO) instrument, which is based on theoretical elements and designed to assess issues pertaining to the quality of nursing documentation (Müller-Staub, Lunney, Odenbreit, et al., 2009). The Q-DIO can be used to assess the precision of both paper-based and electronic nursing records of nursing care, regardless of the use of standardized language (Müller-Staub, 2009; Müller-Staub, Lunney, Odenbreit, et al., 2009). Studies of the Q-DIO from its development through subsequent use have demonstrated its efficacy and validity (Müller-Staub, Lunney, Odenbreit, et al., 2009; Müller-Staub, Lunney, Lavin, et al., 2010; Müller-Staub, Needham, Lunney, et al., 2008; Müller-Staub, Needham, Odenbreit, et al., 2008b). The lack of instruments for comprehensive assessment of nursing records in Brazil prompted us to perform a cross-cultural adaptation of the Q-DIO into Brazilian Portuguese.

Method

Study Design

This was a methodological study carried out at two Brazilian hospitals. Cross-cultural adaptation was performed as recommended in the literature. The study was approved by the Research Ethics Committees of both facilities with protocol numbers 110383 and 464211, respectively. All investigators signed data collection and use forms.

Instrument and Cross-Cultural Adaptation

Prior to the study design stage, permission to adapt the instrument was requested and obtained from the original author. Cross-cultural adaptation consisted of the following stages: translation, synthesis of translations, back-translation, expert committee review, and pretesting of the final draft (Beaton, Bombardier, Guillemin, & Ferraz, 2000).

The Q-DIO consists of a 29 items distributed across four subscales (Nursing Diagnoses as Process, 11 items; Nursing Diagnoses as Product, eight items; Nursing Interventions, three items; Nursing Outcomes, seven items) and scored on a Likert-type scale. The first items of each subscale are considered key items/entry items to the respective subscale; for instance, if item 12 is assigned a low score, so will items 13 through 19.

Scores are graded differently according to subscale. In the original Q-DIO, the 11 items of the Nursing Diagnoses as Process scale are graded on a three-point scale of 0 to 2, whereas all other subscales are graded on a five-point scale of 0 to 4 (Müller-Staub, Lunney, Odenbreit, et al., 2009).

Initial *translation* of the Q-DIO was carried out by two independent translators, both native speakers of Brazilian Portuguese, who had distinct professional profiles (one conversant with the field, the other is not). One translator was made aware of the main concepts of the instrument to enable a translation that better reflected a clinical perspective and was more suited to the purpose of the study. The other translator was not aware of the topic or of the perspective of the instrument.

A *synthesis* of both translations was then made by the lead investigators, after joint analysis of the original instrument and discussion with both translators, to produce a consensus draft. Any potential divergences in terminology or wording were worked out at this stage.

The synthesis version of the instrument was then *back-translated* into English. The translators responsible for this stage were native speakers of English and were not aware of the objectives of the study or of the content of the material. The results of back-translation were as expected, and the final version of the back-translation was then submitted to the author of the original instrument for approval.

Expert committee review consisted of three face-to-face meetings of nine hours total duration. The committee comprised four professors of nursing with doctorate-level qualifications, three students of doctoral programs in nursing, one registered nurse, and a linguist with expertise in Portuguese and English as the bilingual member of the panel. The first meeting was a discussion of all items focusing on semantic, idiomatic, cultural, and conceptual equivalence. During subsequent meetings, the investigators developed conceptual definitions for each item in each of the four Q-DIO subscales on the basis of a literature review. After extensive discussion of these definitions, the expert committee and investigators reached a consensus that the scoring system should be changed. Therefore, three subscales (Nursing Diagnoses as Product, Nursing Interventions, and Nursing

Outcomes) were converted from a five-point to a three-point Likert-type scale, whereas the Nursing Diagnoses as Process subscale kept its original three-point scale. The 29 items of the adapted questionnaire are thus assessed on a three-point Likert-type scale, with 0 being "Not documented," 1 being "Partially documented," and 2 being "Fully documented."

After the last meeting of the expert committee, the modified instrument with its new conceptual definitions, and scoring system were sent to the original author for approval. After this approval was obtained, the final Brazilian version of the Q-DIO was consolidated for pretesting.

Pretesting was performed by the lead investigator on a sample of 40 nursing records (units of observation). Records were obtained from two health facilities, of which one used electronic health records and the other, paper-based records. The nursing records of 20 post-cardiac surgery patients from each facility were randomly selected for inclusion. Randomization was performed in the SPSS 18.0 software package (SPSS Inc., Chicago, IL, USA) and calculated for a 20% sampling loss rate. A list of all patients who underwent cardiac surgery in both hospitals between January and October 2011 was compiled to serve as the master list of records. This process was carried out by a cooperating investigator who did not take part in data collection.

During the pretesting stage, understanding of all items was assessed and evaluated, as was the reliability of the instrument as a whole and of its four subscales, using Cronbach's alpha. The name of the original instrument (Q-DIO) was kept for the Brazilian adaptation.

Results

Table 1 lists the items of the original scale and of the consensus-built adapted version. Six items underwent semantic or cultural modification: 05, 09, 20, 23, 26, and 29.

Pretesting was performed on 40 randomly allocated nursing records, of which 50% were electronic records that used the NANDA-I terminology for documentation of nursing diagnoses, and 50 percent were handwritten records that used no standardized language whatsoever.

The reliability of the adapted version of the Q-DIO was assessed by calculation of Cronbach's alpha for all items as a whole and for each subscale separately (Table 2). Cronbach's alpha was also assessed after deletion of the key items of the instrument (12, 20, 25), yielding a coefficient of 0.96. Likewise, the reliability of each item for the 40 selected nursing records was assessed. Table 3 presents item means, standard deviations, correlations, and Cronbach's alpha if each item deleted.

Discussion

This was the first methodological study of the cross-cultural adaptation of an instrument designed to evaluate

the quality of nursing records on the basis of theoretical elements. Changes made to the Q-DIO over the course of this adaptation involved redaction and modification of terms and expressions, with the objectives of facilitating understanding of items by nursing professionals and ensuring cross-cultural equivalence. Assessment of reliability revealed that the items of the questionnaire correlate among themselves and measure the same attribute.

During expert committee review, items 4 (*coping in the actual situation/with the illness*) and 5 (*beliefs and attitudes about life related to the hospitalization*) were felt to be overly similar. Therefore, the original author of the instrument was asked to provide a specific definition or concept for the items. The first item concerns the patient's coping skills, which usually entails information on how patients have dealt with prior difficulties or health issues and whether these mechanisms can help the patient overcome and deal with situations similar to the current one. The second item does not address the patient's specific health issue but is directed to beliefs (including religion) and attitudes (such as activities of daily living) from a more general standpoint. This item concerns attitudes that should be respected during the patient's hospital stay, but does not concern coping. Therefore, we removed "*related to the hospitalization*" from the item to prevent any difficulties in interpretation during future use of the instrument.

For item 9, "*Significant others (contact person)*," the translators suggested a rendering of "*Pessoas importantes (para contato)*," but the committee decided to keep the shorter wording of "*Pessoas para contato*." This modification was made in the interest of cultural equivalence, as in Brazilian Portuguese, "*Pessoas para contato*" is a broad enough concept that encompasses all significant others, including family members, friends, and caregivers.

In the original instrument, assessment of items 13, 20, and 26 was based on a reference handbook used in the clinical practice of nursing in Switzerland (Doenges, Moorhouse, & Murr, 2008) that uses nursing intervention concepts similar to the Nursing Interventions Classification (NIC) and Nursing Outcomes Classification (NOC). For cross-cultural adaptation to the Brazilian reality, we chose to keep the term "NANDA" (item 13) and redact the terms "NIC" (item 20) and "NOC" (item 26), so as to approximate the instrument to the terminology and theoretical framework used by Brazilian nurses in clinical practice.

The term "*pelo menos*" (at least) was added to item 23 in the interest of understanding, to clarify that assessment should be performed *at least* every fourth day, not *every fourth day* exactly. Finally, the word "*internally*" was removed from item 29, as its exclusion would have no effect on the meaning of the statement in Portuguese.

Changes in scoring sought to avoid subjectivity and preserve the accuracy of the measurement. The committee determined that there was no possibility that certain items would be scored over a five-point range, with scores being assigned only at the anchors or midpoint of the five-point scale, which would justify harmonization of all subscales to

Table 1. Original and Translated/Adapted Version of the Quality of Diagnoses, Interventions and Outcomes (Q-DIO) Instrument

Original instrument	Instrument translated and adapted into Brazilian Portuguese
Nursing diagnoses as process	Diagnósticos de enfermagem como processo
Information is documented about:	Dados da informação registrada:
1. Actual situation, leading to the hospitalization	1. Situação atual que levou a internação
2. Anxiety and worries related to hospitalization, expectations and desires about hospitalization	2. Ansiedade, preocupações, expectativas e desejos relacionados à internação
3. Social situation and living environment/circumstances	3. Situação social e ambiente/circunstâncias em que vive
4. Coping in the actual situation/with the illness	4. Enfrentamento da situação atual/com a doença
5. Beliefs and attitudes about life (related to the hospitalization)	5. Crenças e atitudes em relação à vida
6. Information of the patient and relatives/significant others about the situation	6. Informações sobre o paciente e familiares/outras pessoas importantes na situação
7. Intimacy, being female/male	7. Questões sobre intimidade pessoal relacionadas ao gênero
8. Hobbies, activities for leisure	8. Hobbies, atividades de lazer
9. Significant others (contact persons)	9. Pessoas para contato
10. Activities of daily living	10. Atividades da vida diária
11. Relevant nursing priorities according to the assessment	11. Prioridades relevantes de enfermagem de acordo com a avaliação
Nursing diagnoses as product	Diagnósticos de enfermagem como produto
12. Nursing diagnosis label is formulated	12. Problema de Enfermagem/Título do diagnóstico está registrado
13. Nursing diagnosis label is formulated according to NANDA and is numbered	13. Título do diagnóstico está formulado e numerado de acordo com a NANDA.
14. The etiology (E) is documented	14. A etiologia (E) está registrada
15. The etiology (E) is correct, related/corresponding to the nursing diagnosis (P)	15. A etiologia (E) está correta, e corresponde ao diagnóstico de enfermagem (P)
16. Signs and symptoms are formulated	16. Os sinais e sintomas estão registrados
17. Signs and symptoms (S) are correctly related to the nursing diagnosis (P)	17. Os sinais e sintomas (S) estão corretamente relacionados com o diagnóstico de enfermagem (P)
18. The nursing goal relates/corresponds to the nursing diagnosis	18. A meta de enfermagem se relaciona/corresponde ao diagnóstico de enfermagem
19. The nursing goal is achievable through nursing interventions	19. A meta de enfermagem é alcançável por meio das intervenções
Nursing interventions	Intervenções de Enfermagem
20. Concrete, clearly named nursing interventions—according to NIC—are planned (what will be done, how, how often, who does it)	20. Concretas, claramente nomeadas e planejadas (o que será realizado, como, com que frequência, por quem)
21. The nursing interventions effect the etiology of the nursing diagnosis	21. As intervenções de enfermagem têm efeito sobre a etiologia dos diagnósticos de enfermagem
22. Nursing interventions carried out, are documented (what was done, how, how often, who did it)	22. As intervenções de enfermagem realizadas estão registradas (o que foi realizado, como, com que frequência e por quem)
Nursing outcomes	Resultados de Enfermagem
23. Acute, changing diagnoses are assessed daily or from shift to shift/ enduring diagnoses are assessed every fourth day	23. Mudanças críticas de diagnósticos são avaliadas diariamente ou turno a turno/ diagnósticos prolongados são avaliados pelo menos a cada quatro dias
24. The nursing diagnosis is reformulated	24. O diagnóstico de enfermagem está reformulado
25. The nursing outcome is documented	25. O resultado de enfermagem está registrado
26. The nursing outcome is observably/measurably documented according to Nursing Outcomes Classification	26. O resultado de enfermagem é observável/medido e registrado
27. The nursing outcome shows	27. O resultado de enfermagem indica:
– improvement in patient's symptoms	– melhora dos sintomas do paciente
– improvement of patient's knowledge state	– melhora do conhecimento do paciente
– improvement of patient's coping strategies	– melhora das estratégias de enfrentamento do paciente
– improved self-care abilities	– melhora das habilidades de autocuidado
– improvement functional status	– melhora no estado funcional
28. There is a relationship between (or connection of) nursing outcomes + nursing interventions	28. Existe uma relação entre os resultados e as intervenções de enfermagem
29. Nursing outcomes and nursing diagnoses are internally related	29. Os resultados e os diagnósticos de enfermagem estão relacionados

Table 2. Overall and Subscale Reliability

Nursing records (n = 40)	Items analyzed	Valid instruments	Cronbach's alpha
Complete instrument (Q-DIO)	29	40	0.97
Subscales			
Nursing diagnoses as process	11	40	0.88
Nursing diagnoses as product	8	40	0.95
Nursing interventions	3	40	0.66
Nursing outcomes	7	40	0.97

Table 3. Reliability Analysis of Items in the Nursing Diagnoses, Nursing Interventions, and Nursing Outcomes Subscales

	Item mean	SD	Corrected item-total correlation	Cronbach's alpha if item deleted
1. Situação atual que levou a internação	1.00	0.987	0.832	0.964
2. Ansiedade, preocupações, expectativas e desejos relacionados à internação	0.22	0.423	0.609	0.965
3. Situação social e ambiente/circunstâncias em que vive	0.20	0.464	0.495	0.966
4. Enfrentamento da situação atual/com a doença	0.22	0.423	0.581	0.965
5. Crenças e atitudes em relação à vida	0.08	0.267	0.326	0.966
6. Informações do paciente e familiares/pessoas significativas sobre a situação	0.12	0.335	0.438	0.966
7. Questões sobre intimidade pessoal relacionadas ao gênero	0.08	0.267	0.326	0.966
8. Hobbies, atividades de lazer	0.10	0.304	0.394	0.966
9. Pessoas para contato	0.20	0.564	0.338	0.967
10. Atividades da vida diária	0.35	0.483	0.611	0.965
11. Prioridades relevantes de enfermagem de acordo com a avaliação	0.50	0.679	0.653	0.965
12. Problema de Enfermagem/Título do diagnóstico está registrado	1.42	0.636	0.927	0.963
13. Título do diagnóstico está formulado e numerado de acordo com a NANDA-I	1.42	0.636	0.927	0.963
14. A etiologia (E) está registrada	1.22	0.862	0.919	0.963
15. A etiologia (E) está correta, e corresponde ao DE (P)	1.22	0.862	0.869	0.963
16. Os sinais e sintomas estão registrados	1.05	0.597	0.698	0.964
17. Os sinais e sintomas (S) estão corretamente relacionados com o DE (P)	1.38	0.740	0.746	0.964
18. A meta de enfermagem se relaciona/corresponde ao DE	1.10	0.709	0.757	0.964
19. A meta de enfermagem é alcançável por meio das intervenções	1.05	0.714	0.740	0.964
20. Concretas, claramente nomeadas e planejadas (o que será realizado, como, com que frequência, por quem).	1.80	0.564	0.489	0.966
21. As intervenções de enfermagem têm efeito sobre a etiologia dos diagnósticos de enfermagem	1.00	0.751	0.683	0.965
22. As intervenções de enfermagem realizadas estão registradas (o que foi realizado, como, com que frequência e por quem).	1.05	0.450	0.071	0.968
23. Mudanças críticas de diagnósticos são avaliadas diariamente ou turno a turno/ diagnósticos prolongados são avaliados pelo menos a cada quatro dias	1.30	0.791	0.868	0.963
24. O diagnóstico de enfermagem está reformulado	1.25	0.840	0.888	0.963
25. O resultado de enfermagem está registrado	0.48	0.506	0.857	0.964
26. O resultado de enfermagem é observável/medido	0.50	0.506	0.919	0.963
27. O resultado de enfermagem indica melhora – sintomas do paciente – conhecimento do paciente – estratégias de enfrentamento do paciente – habilidades de autocuidado – estado funcional	1.08	0.917	0.923	0.963
28. Existe uma relação entre os resultados e as intervenções de enfermagem	0.75	0.840	0.838	0.963
29. Os resultados e os diagnósticos de enfermagem estão relacionados	1.00	0.934	0.925	0.963

a similar three-point scale. Therefore, all items should be classified as either “partially documented” or “fully documented” if any documentation exists. Consensus-based operational definitions were developed for each item so that investigators could distinguish between partial and full documentation; these definitions shall be published in a subsequent article.

Pretesting of reliability revealed a Cronbach's alpha coefficient of 0.97 for the complete instrument ($n = 40$).

Similar values have been reported in other studies of the Q-DIO since its original pilot study (Müller-Staub, Lavin, Needham, & van Achterberg, 2006; Müller-Staub et al., 2007; Müller-Staub, Lunney, Lavin, et al., 2008).

The present study stands out from previous investigations of the Q-DIO not merely in language and culture but also by the fact that the pretesting sample consisted of nursing records from different settings—both electronic health records and conventional handwritten notes—and

with and without the use of standardized nursing terminology, which provides a wide diversity of records for assessment and use of the instrument. It bears stressing that this instrument was designed to assess the quality of nursing documentation regardless of the use of standardized language, and can thus be implemented in any health facility. The present study also stands out due to our change in the scoring system to a single three-point scale, whereas prior studies used a five-point scale in part of the instrument.

Conclusions

Cross-cultural adaptation of the Q-DIO has led to a preliminary Brazilian Portuguese version of this instrument. However, this is merely one stage of the process; assessment of psychometric properties such as reliability and validity in a larger sample of nursing records is required. Such a study is being developed and will be presented to the scientific community in as it arises. Another proposal for subsequent research involves the operational definitions of each item. The results obtained thus far lead us to infer that the Q-DIO can be a reliable instrument for assessment of the quality of nursing documentation in Brazil.

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References

- Beaton, D., Bombardier, C., Guillemin, F., & Ferraz, M. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine (Philadelphia, Pa.: 1976)*, 25(24), 3186-3181.
- Doenges, M. E., Moorhouse, M. F., & Murr, A. C. (2008). *Nurse's pocket guide: Diagnoses, prioritized interventions, and rationales* (11th ed.). Philadelphia: F. A. Davis.
- Häyrinen, K., Lammintakanen, J., & Saranto, K. (2010). Evaluation of electronic nursing documentation—Nursing process model and standardized terminologies as keys to visible and transparent nursing (2010). *International Journal of Medical Informatics*, 79(8), 554-564.
- Linch, G. F. C., Müller-Staub, M., & Rabelo, E. R. (2010). Quality of nursing records and standardized language: Analysis and comments. *Online Brazilian Journal of Nursing*, 9(2), 1-10. [serial on the Internet]. (Cited 2012, January 8); Retrieved from <http://www.objnursing.uff.br/index.php/nursing/article/view/3088>.
- Müller-Staub, M. (2009). Evaluation of the implementation of nursing diagnoses, interventions and outcomes. *International Journal of Nursing Terminologies and Classifications*, 20(1), 9-15.
- Müller-Staub, M., Lavin, M., Needham, I., & van Achterberg, T. (2006). Nursing diagnoses, interventions and outcomes—Application and impact on nursing practice: Systematic review. *Journal of Advanced Nursing*, 56(5), 514-531.
- Müller-Staub, M., Lunney, M., Lavin, M., Needham, I., Odenbreit, M., & van Achterberg, T. (2008). Testing the Q-DIO as an instrument to measure the documented quality of nursing diagnoses, interventions and outcomes. *International Journal of Nursing Terminologies and Classifications*, 19(1), 20-27.
- Müller-Staub, M., Lunney, M., Lavin, M. A., Needham, I., Odenbreit, M., & van Achterberg, T. (2010). Testtheoretische Gütekriterien des Q-DIO, eines Instruments zur Messung der Qualität der Dokumentation von Pflegediagnosen, -interventionen und -ergebnissen. *Pflege: Die Wissenschaftliche Zeitschrift für Pflegeberufe*, 23(2), 119-128.
- Müller-Staub, M., Lunney, M., Odenbreit, M., Needham, I., Lavin, M., & van Achterberg, T. (2009). Development of an instrument to measure the quality of documented nursing diagnoses, interventions and outcomes: The Q-DIO. *Journal of Clinical Nursing*, 18(7), 1027-1037.
- Müller-Staub, M., Needham, I., Lunney, M., Odenbreit, M., Lavin, M. A., & van Achterberg, T. (2008). Qualität von Pflegediagnosen—interventionen und -ergebnissen: Kriterien und Operationalisierung des Meßinstruments Q-DIO. *Pflege: Die Wissenschaftliche Zeitschrift für Pflegeberufe*, 21(5), 327-338.
- Müller-Staub, M., Needham, I., Odenbreit, M., Lavin, M., & van Achterberg, T. (2007). Improved quality of nursing documentation: Results of a nursing diagnoses, interventions and outcomes implementation study. *International Journal of Nursing Terminologies and Classifications*, 18(1), 5-17.
- Müller-Staub, M., Needham, I., Odenbreit, M., Lavin, M., & van Achterberg, T. (2008b). Implementing nursing diagnostics effectively: Cluster randomized trial. *Journal of Advanced Nursing*, 63(3), 291-301.
- Needleman, J., & Buerhaus, P. (2003). Nurse staffing and patient safety: Current knowledge and implications for action. *International Journal for Quality in Health Care*, 15(4), 275-277.
- Odenbreit, M., Müller-Staub, M., Brokel, J., Avant, K., & Keenan, G. (2012). Nursing classifications: Criteria and evaluation. In H. Herdman (Ed.), *Nanda international nursing diagnoses: Definition & classification, 2012-2014* (pp. 133-143). Oxford, UK: Wiley-Blackwell.
- Paans, W., Sermeus, W., Nieweg, R., & van der Schans, C. (2010). Prevalence of accurate nursing documentation in patient records. *Journal of Advanced Nursing*, 66(7), 01-09.
- Pokorski, S., Moraes, M., Chiarelli, R., Costanzi, A., & Rabelo, E. (2009). Nursing process: From literature to practice. What are we actually doing? *Revista Latino-Americana de Enfermagem*, 17(3), 302-307.
- Santos, S. R., de Paula, A. F. A., & Lima, J. P. (2003). Nurses attitude toward the manual recording system of medical records. *Revista Latino-Americana de Enfermagem*, 11(1), 80-87.
- Saranto, K., & Kinnunen, U. (2009). Evaluating nursing documentation—research designs and methods: Systematic review. *Journal of Advanced Nursing*, 65(3), 464-476.
- Tiffany, F., Kelley, M. S., Brandon, D. H., & Docherty, S. L. (2011). Electronic nursing documentation as a strategy to improve quality of patient care. *Journal of Nursing Scholarship*, 43(2), 154-162.