

Impact Of An Educational Program And Electronic Nursing Documentation On The Quality Of Nursing Care Process March 2022

Maysah Mashkori Manaser¹, Mojeba Ali Ali Abdly², Maher Farah Alsulami³, Omnya Saad Alsaedi⁴, Alaa Saad Alharthi⁵, Mohammed Oayedh Aljeaed⁶, Saif Maqbool Alzaidi⁷, Hasan Abdullah Alzaidi⁸, Sadiyah Yahya Alfahmy⁹

Abstract

Purpose:

The purpose of this study was to assess the effectiveness of the educational program "Guided Clinical Reasoning" (GCR) and the implementation of an intelligent electronic nursing documentation system (e-doc) on the quality of the nursing process.

Methods:

The evaluation was conducted at three different measurement points using the "Quality of Nursing Diagnoses, Interventions, and Outcomes" (Q-DIO) instrument.

Findings:

Results indicated that GCR yielded the highest Q-DIO scores, suggesting its effectiveness in enhancing the quality of the nursing process. However, no long-term effect was observed after the cessation of GCR. Conversely, the e-doc system produced the lowest scores, although it provided adequate support for utilizing nursing diagnoses

Conclusions:

While e-docs have the potential to assist in conducting the nursing process, this study underscores the importance of clinical reasoning for meaningful utilization of electronic documentation systems.

Background

In 2004, a midsized Swiss general hospital implemented the nursing process based on the NNN taxonomy. To facilitate this implementation¹, an educational program known as "Guided Clinical Reasoning" (GCR) was introduced (see Table 1). A pre-test/post-test evaluation study conducted in 2005 revealed significant improvements in the quality of documentation, including assessment, nursing diagnoses (ND), interventions, and outcomes ($p < .0001$) (Müller-Staub et al., 2007).

To further enhance the quality of the diagnostic process, an advanced version of GCR

¹Nursing Technician PHCC Aljuranah Makkah Saudi Arabia

²Nursing Technician PHCC Aljuranah Makkah Saudi Arabia

³Nursing Technician Alnoor Hospital Makkah Saudi Arabia

⁴Nursing Technician Alnoor Hospital Makkah Saudi Arabia

⁵Physiotherapist nurse Heraa General Hospital Makkah Saudi Arabia

⁶Nursing Technician Department of Infectious Diseases and Disease Vector Control Taif Saudi Arabia

⁷Nursing Technician Department of Infectious Diseases and Disease Vector Control Taif Saudi Arabia

⁸Nursing Technician willpower and mental health Taif Saudi Arabia

⁹Nursing Technician Aladel PHCC Makkah Saudi Arabia.

was conducted in 2006. This was followed by a randomized intervention study comparing a traditional case study group (control group) with an intervention group receiving GCR. In the control group, nurses were simply informed about the link between ND, interventions, and outcomes before engaging in discussion. In contrast, the intervention group underwent training in critical thinking and clinical reflection through GCR, which encouraged them to establish evidence-based connections between ND, effective interventions, and nursing-sensitive outcomes (Müller-Staub, Needham, Odenbreit, Lavin, & van Achterberg, 2008).

Despite investing the same amount of time in both groups, the intervention group receiving GCR demonstrated significantly higher accuracy in nursing diagnoses, effectiveness of interventions, and improved patient outcomes ($p < .0001$).

Table 1. Overview of the Content of Guided Clinical Reasoning and Classic Case Discussions

Method	Guided clinical reasoning discussions	Classic case
Aim of method utilization of used NANDA-I related	To facilitate critical thinking and reflection, in order to state accurate nursing NANDA-I nursing diagnoses, related interventions, and outcomes	To support accurate diagnoses, interventions, and outcomes
Pedagogical distillation, approach iterative hypothesis	Interactive method, using iterative hypothesis testing by asking questions.	Knowledge no testing applied.

Method	Guided clinical reasoning	Classic case discussions
	<p>To obtain diagnostic data, nurses were asked for signs/symptoms seen in the patient, and asked for possible etiologies, as well as to link them with effective nursing interventions.</p>	<p>Knowledge about interventions and outcomes were asked for presented.</p>
	<p>Nurses were fostered to state nursing outcomes, coherent to the nursing interventions and to the etiologies stated.</p>	
	<p>Accuracy was verified by asking questions and by applying nursing diagnoses, interventions, and outcomes theory.</p>	
<p>Pedagogical approach specified to the content of the session</p>	<p>Internal coherence between nursing diagnoses</p>	

- Note: Adapted from Müller-Staub (2006, p. 120).

In 2008, the GCR program was suspended during the implementation of the electronic nursing documentation system (e-doc) “WiCare Dok” 2008. The e-doc used is an intelligent decision support tool (Courtney et al., 2008) established on the theory-based NNN taxonomy assessment. When patient information is documented in the nursing report or in the assessment, the e-doc uses trigger words to derive hypothetical ND and automatically suggests NDs and makes suggestions automatically. In accordance with

the ND chosen by nurses, the e-doc proposes nursing interventions and outcomes. Periodically, nurses are requested to evaluate the process (Burri, Odenbreit, & Scharer, 2010; WigaSoft, 2012). All members of the staff were trained to use the NNN nursing process with the help of e-doc.

The aim of this study was to investigate whether the GCR program has a lasting effect on the whole nursing process. This means changes in the assessment quality, diagnostic accuracy, intervention effectiveness, and outcome (nursing process) as defined by the instrument “Quality of Nursing Diagnoses, Interventions and Outcomes” (Q-DIO; Müller-Staub, Lunney, et al., 2008) (Table 2). The lasting effect of GCR over time was examined from 2005 to 2011 at three measurement points (2005, 2006, and 2011). It was expected that in 2011 the e-doc would support the assurance of quality of the nursing process achieved by GCR. Therefore, the second objective

was to test the assumption that the e-doc provided suiting (according to the content in nursing assessments and reports) and sufficient NDs and to examine how well nurses used ND working with the decision support tool (e-doc). Consequently, an assessment and comparison of the frequency and accuracy of ND, as used by nurses and the e-doc were conducted in 2011. The study was based on four research questions: (a) Did the GCR program have a significant, lasting effect on the quality of the nursing process between 2005 and 2011? (b) How frequently and accurately did nurses use ND with the support of the e-doc in 2011? (c) How frequently and accurately did the e-doc suggest ND in 2011? (d) Compared with the actual use of ND by nurses, how many accurate ND did the e-doc suggest in 2011?

Table 2. Measuring Instrument Q-DIO

Measurement instrument Q-DIO	3-point scale		
Nursing diagnoses as process. Information is documented about:	2	1	0
1. Actual situation, leading to the hospitalization			
2. Anxiety and worries related to hospitalization, expectations, and desires about hospitalization			
3. Social situation and living environment/circumstances			
4. Coping in the actual situation/with the illness			
5. Beliefs and attitudes about life (related to the hospitalization)			
6. Information of the patient and relatives/significant others about the situation			
7. Intimacy, being female/male			
8. Hobbies, activities for leisure			
9. Significant others (contact persons)			
10. Activities of daily living			

Measurement instrument Q-DIO

3-point scale

Nursing diagnoses as process. Information is documented about:

2 1 0

11. Relevant nursing priorities according to the assessment

11 Items, maximum score = 22, mean = 2

Nursing diagnoses as product

5-point scale

4 3 2 1 0

12. Nursing problem/nursing diagnosis label is documented

13. Nursing diagnosis is correctly formulated and numbered

14. The etiology (E) is documented

15. The etiology (E) is correct, related/corresponding to the nursing diagnosis (P)

16. Signs and symptoms are formulated

17. Signs and symptoms (S) are correctly related to the nursing diagnosis (P)

18. The nursing goal relates/corresponds to the nursing diagnosis

19. The nursing goal is achievable through nursing interventions

8 items, maximum score = 32, mean = 4

Nursing interventions

4 3 2 1 0

20. Concrete, clearly named nursing interventions are planned (what will be done, how, how often, who does it)

Nursing interventions	4	3	2	1	0
<p>21. The nursing interventions affect the etiology of the nursing diagnosis</p> <p>22. Nursing interventions carried out, are documented (what was done, how, how often, who did it)</p> <p>3 Items, maximum score = 12, mean = 4</p>					
Nursing-sensitive patient outcomes	4	3	2	1	0
<p>23. Acute, changing diagnoses are assessed daily or from shift to shift/enduring diagnoses are assessed every fourth day</p> <p>24. The nursing diagnosis is reformulated</p> <p>25. The nursing outcome is documented</p> <p>26. The nursing outcome is observably/measurably documented</p> <p>27. The nursing outcome shows</p> <ul style="list-style-type: none"> - improvement in patient's symptoms - improvement of patient's knowledge state - improvement of patient's coping strategies - improved self-care abilities - improvement in functional status <p>28. Nursing-sensitive patient outcomes and nursing interventions are internally related</p>					

Nursing interventions	4	3
	2	1
	0	
29. Nursing-sensitive patient outcomes and nursing diagnoses are internally related		
7 Items, maximum score = 28, mean = 4		Total
Items 29		

- Note: Adapted from Müller-Staub (2006, p. 84).

Methods

Design

For the first research question, a quantitative comparative design was chosen (Analysis 1). For the second and third research question (Analysis 2), a descriptive design was deemed appropriate.

Measuring Instrument

Müller-Staub et al. (2008,2008) developed the research-based instrument “Q-DIO (Table 2) for standardized evaluation of the quality of the documented nursing process. Psychometric testing showed good internal consistency, stability, and reliability (Müller-Staub et al., 2006, 2010). The instrument consists of four literature-based dimensions within a total of 29 items. Each item is assessed by a Likert scale. Dimension 1 (ND as a process) evaluates assessment quality and has a 3-point scale. Dimension 2 to 4 (ND as product, nursing interventions and nursing-sensitive patient outcomes) contain a 5-point scale. They are used to assess the accuracy of ND, the effectiveness of nursing interventions, and the quality of patient outcomes. The dimensions are added up separately and compared group wise (Table 2, Q-DIO instrument).

Ethical Considerations

The application was submitted to the Ethics Commission of the study hospital and was authorized for all three groups (2005, 2006, and 2011). Nurses were informed about the study and “informed consent” was given by the nursing managers and the corresponding department. The secondary data were coded in SPSS (IBM SPSS Statistics for Windows, Version 21.0, IBM Corp., Armonk, NY, USA) format. The e-docs (Group 3) were forwarded to the researcher in anonymous form.

Samples

Three samples were retrieved from the same hospital in Switzerland. Group 1 (2005) consisted of the results of 36 Q-DIO rated nursing documentation adopted from the post-intervention group of a previous study conducted by Müller-Staub et al. (2007) 1 year after implementing nursing

diagnostics. Group 2 (2006) similarly comprised 36 randomly drawn Q-DIO data sets by SPSS (statistics program “PASW Statistics,” Vers.19.0, SPSS Inc., 2010). These results originated from 111 GCR post-study intervention data sets of a study from Müller-Staub et al. (2008,2008). Nurses in 2011 had used the e-doc for 3 years. Data of Group 3 (2011) consisted of 36 randomly assigned nursing documentations. While Groups 1 and 2 consisted of randomized and controlled data, Group 3 consisted of a convenience sample, thus preventing a genuine longitudinal research study. Therefore, the outcome was called “long lasting effect.” As the data of Group 1 and 2 were used once to answer the first research question, the data of Group 3 were used twice to answer the second to fourth research questions.

Data Collection

In Analysis 1, the Q-DIO data of Groups 1 and 2 were used in secondary analysis. Data for the Q-DIO dimension 1 were missing in Group 2. The nursing documentations of Group 3 were assessed in primary analysis using Q-DIO. The validity of the Q-DIO rating by the first author was verified through an independent evaluation of the data by the developer of Q-DIO. In Analysis 2, six variables were chosen by an expert panel to answer the second through fourth research question. Each nursing documentation in Group 3 was subjected to multiple readings and the following were collected (a) total suggested hypothetical ND by the e-doc, (b) accurate hypothetical ND, (c) total of ND used by nurses, (d) accurate ND used by nurses, (e) range of accurate suggestions of hypothetical ND, and (f) range of accurately used ND. Accuracy was defined as the correct content use of ND in terms of the patient situation as stated in the assessment and nursing report, and described not only by ND titles but by defining characteristics and related factors. This analysis was verified through the rigorous use of the NANDA taxonomy (Doenges, Moorhouse, & Murr, 2008).

Data Analysis

Analysis 1 (research question 1: Did the GCR program have a significant, lasting effect on the quality of the nursing process between 2005 and 2011?) evaluated the quality of the documented nursing process over time by comparing the three groups rated by Q-DIO (2005, 2006, and 2011). To achieve this, the mean values of the four dimensions were examined and treated as independent groups. Differences between groups were calculated applying the Mann–Whitney U-test (dimension 1), and the Kruskal–Wallis test with pairwise comparisons and adjustments according to Bonferroni (dimension 2). In dimensions 3 and 4, Kruskal–Wallis and post hoc Games–Howell tests were used (Brosius, 2008; Field, 2009). In Analysis 2, a descriptive design was used to answer the second through fourth research question concerning the use of and support provided for choosing ND. For the second and third research question (How frequently and accurately did nurses use ND with the support of the e-doc in 2011? How frequently and accurately did the e-doc suggest ND in 2011?), the number of ND used by nurses as well as the hypothetical ND suggested by e-doc were calculated along with their degree of content accuracy. For the fourth research question (Compared with the actual use of ND by nurses, how many accurate ND did the e-doc suggest in 2011?), the ratio between the suggestion of accurate ND through the e-doc and the use of accurate ND by nurses were established. Statistical analysis of both research questions was conducted using the program SPSS with the significance level defined at $\alpha = .05$.

Results

Analysis 1 showed that the highest levels of quality of the documented nursing process were found in 2006 after the second training with GCR (Group 2). Groups 1 (introduction of nursing diagnostics to the nursing process) and 3 (introduction of the e-doc, suspended GCR program) were almost on a par. They differed in that Group 1 showed significantly better “assessment quality” than Group 3 ($p = .002$), and Group 3 showed better skills in phrasing exact ND than Group 1 ($p = .05$). An overview of the

group differences is given in Table 3.

Table 3. Overview of Group Differences in Analysis 1

Intervention	Dim 1	Dim 2	Dim 3	Dim 4
Group 1	Rank 1	Rank 3	Rank 3	Rank 3
Implementation of better diagnostics	G1 sig. worse than G2, than G3 (p = .002)	sig. worse than G2, no sig. G3	sig. worse than G2, no difference to G3 (p = .998)	sig. worse than nursing significant difference to G3 (p = .247)
Group 2	X	Rank 1	Rank 1	Rank 1
Intervention “Guided Clinical Reasoning”		sig. better than G1 (p = .005)	sig. better than G1 (p < .000) and G3 (p < .000)	sig. better than G1 (p < .000) and G3 (p < .000)
Group 3	Rank 2	Rank 2	Rank 3	Rank 3
Implementation of doc and suspended GCR	G3 sign. worse (.05) better than G1	almost sign. (p = G2 G1, not sign.	sign. worse than G2	sign. worse than e-

Intervention	Dim 1	Dim 2	Dim 3	Dim 4
		worse than G2 (p = 1.000)		

- Note: G, Group; Rank, best rank 1, then 2, then 3; Dim, dimension; sig, significant at $\alpha = .05$.

Research question 1 revealed that despite significant improvements from the first to the second GCR training (Group 2) in 2006, no long-term effect could be found in 2011. This means that Group 3 could not maintain the high-quality level of Group 2, other than for the “accuracy of ND used” ($p = 1.000$).

Concerning electronic documentation, Analysis 1 did not show better results through the use of the e-doc (Group 3). Rather, in contrast to Group 1, Group 3 showed a significant decline in the “quality of assessments” ($p = .002$). Group 2 attained significantly better results in documented interventions and patient outcomes ($p < .000$). However, in the dimension “accuracy of ND used” Groups 2 and 3 didn't show a significant difference ($p = 1.000$), and Group 3 showed a near significant improvement to Group 1 ($p = .05$).

Research question 2 answered in Analysis 2 established that, per patient record, nurses chose a maximum of five different ND (range = 0–5), with 94.7% accuracy. On average, 1.47 distinct, accurate ND (SD = 1.028, 95% [CI = 1.12, 1.82]) were selected. In most cases (21 of 36; 58.3%), only one correct ND was chosen, and was used a median of 17.08 times (range = 0–87, SD = 23.87, 95% [CI = 9.01, 26.06]).

Research question 3 showed that the e-doc reached a quota of 61.5% accuracy in suggested hypothetical ND. The intelligent electronic expert system identified a total of 30.22 accurate ND (range 0–148, SD = 30.66, 95% CI [19.85, 40.60]) and a range of 9.75 different, accurate hypothetical ND (range = 0–24, SD = 5.51, 95% [CI = 7.89, 11.61]) per patient record.

The result of research question 4 was that the average ratio between accurate suggestions of the e-doc and the ND used by nurses amounted to 6.6:1.

Discussion

The significant improvement in the quality of the documented nursing process observed in Groups 1 and 2, as evidenced by randomized and controlled data, can be attributed to the Guided Clinical Reasoning (GCR) program. This finding is consistent with the results reported by Müller-Staub et al. (2008, 2007, 2008), which indicate that GCR significantly enhances the accuracy of diagnoses and the effectiveness of interventions, ultimately leading to improved patient outcomes.

However, the comparability of the results of Group 3 is limited due to its quasi-experimental design. The deterioration in results observed in Group 3 may be attributed to several factors, including the loss of skills acquired through the GCR program and the introduction of the electronic documentation (e-doc) system. These factors will be further discussed. Electronic Support and the Maintenance of Acquired GCR Skills

The introduction of the e-doc was aimed at maintaining a high level of quality in nursing documentation (Burri et al., 2010). However, while Group 2 (2006) showed significant improvement with the implementation of GCR compared to Group 1 (2005), Group 3 (introduction of the e-doc) exhibited the most pronounced deficiencies in documenting the nursing process. Despite evidence indicating that experience enhances documentation accuracy (Paans, Sermeus, Nieweg, & van der Schans, 2010), the results of Group 3 regressed to the level of Group 1 one year after the introduction of nursing

diagnostics. Despite a refresher course in 2008 coinciding with the introduction of the e-doc, the proficiency levels achieved in 2006 could not be sustained through 2011.

If the improved results in 2006 were attained through continuous training and guidance from specialized GCR instructors, enhancing nurses' critical thinking, clinical reflection, and accuracy skills, then the three-year gap between the refresher course and the Q-DIO evaluation in 2011 may have been too long to maintain the acquired GCR skills. This decline in skills over time is a phenomenon observed in other e-docs supporting the nursing process (Estrada & Dunn, 2012; Kelley et al., 2011; Thoroddsen et al., 2011).

Despite demonstrating the lowest results in other aspects of the nursing process, Group 3, in its utilization of the e-doc, performed better on average than Group 1 and was comparable to Group 2 in formulating nursing diagnoses (NDs). This can be attributed to the automated nature of formulating NDs, where the e-doc rigorously guides nurses through the PES-steps (problem, etiology or related factors, symptoms, or defining characteristics) by providing standardized suggestions of NANDA-I diagnoses. Additionally, the e-doc offered a wider range of accurate NDs than those selected and used by nurses. This suggests that the e-doc serves as an effective and practical electronic decision support system, a crucial aspect of proficient e-doc usage (Ball et al., 2000; Kossman & Scheidenhelm, 2008; Paans et al., 2011).

However, despite the availability of accurate ND suggestions from the e-doc, nurses made limited use of them, with only one out of seven accurate NDs suggested being selected by nurses. This implies that factors other than the efficacy of the decision support system need to be explored to understand this discrepancy.

Influencing Factors and Barriers

Observing clinical practice in the hospital revealed several potential factors that could have contributed to the results found in 2011, including high staff turnover, suspension of the GCR program, and a change in management priorities. However, the results of Groups 1 and 3 showed a similar level of Q-DIO in stating nursing diagnoses (ND), indicating that the basic ability to lead the nursing process was not lost. Instead, the study suggests that the advanced ability to conduct a differentiated and reflective nursing process using a broad spectrum of specific, standardized nursing language, such as the NNN taxonomy, seemed to be lacking (Estrada & Dunn, 2012; O'Connor et al., 2000).

The authors propose that one factor contributing to the deteriorated results of Group 3 was the lack of practice in critical thinking and clinical reflection, particularly due to the cessation of the GCR program and its specific support in critical thinking. While electronic documentation systems (e-docs) can enhance the efficiency and accuracy of nursing diagnoses with experience (Estrada & Dunn, 2012), the study suggests that broad electronic assistance, such as offering hypothetical nursing diagnoses based on nurses' assessment notes in the e-doc, could not replace the previous ability to think critically and reflect on the clinical situation throughout all steps of the nursing process.

Literature indicates several barriers to the use of e-docs and nursing diagnostic systems. These barriers include insufficient understanding of the NNN taxonomy or the e-doc, structural and environmental factors such as insufficient time for reflection and documentation, and issues with the location, speed, accessibility, and reliability of computers and e-doc programs (Kohle-Ersher et al., 2012; Paans et al., 2011; Stevenson et al., 2010). Additionally, attitudes of stakeholders in management and nurses, including lack of acceptance, can also impact the use of e-docs (Huryk, 2010; Kelley et al., 2011; Maust, 2012).

Regardless of the contributing factors, the progressive deterioration of the quality of e-doc use in the nursing process warrants critical examination. If the nursing process with the NNN taxonomy is to accurately depict clinical practice, nurses must be proficient in documenting day-to-day clinical practice using this standardized professional language.

Conclusions

This study demonstrated that the GCR program, when implemented, had a positive impact on the quality of the nursing process within one year. However, the researchers were unable to confirm a sustained positive effect of the GCR program on the quality of nursing process documentation after its suspension, despite the availability of an electronic documentation system (e-doc). The findings suggest that while introducing an e-doc system may enhance the optimization of the nursing process, it cannot fully substitute for ongoing advanced application of critical thinking and guided clinical reflection. Moreover, this study highlighted potential factors influencing the quality, frequency, and accuracy of nursing diagnoses, the effectiveness of interventions, and the overall quality of patient outcomes following the implementation of the e-doc system in the hospital under study. It is concluded that continual support for nurses, awareness of barriers to conducting the nursing process, and appropriate utilization of intelligent decision-support tools are essential for maintaining a high level of quality in nursing process documentation.