

# Are quantitative methods sufficient to show why wards react differently to computer-based nursing documentation?

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**Abstract.** Computer-based documentation of the nursing process is being introduced into hospitals more and more. Frequently, the introduction is followed by an evaluation of positive and negative effects. However, the often-used quantitative evaluation methods cannot fully illuminate the different success factors of computer-based nursing documentation systems.

*We introduced a computer-based nursing documentation system on four wards of the University Medical Centre of Heidelberg and systematically evaluated its effects in a two-year study. The quantitative analysis of the results showed that the wards reacted differently to the documentation system. In this paper, we will first take a look at the quantitative results of our evaluation study, and will then discuss possible reasons for the detected differences. We will then argue that only qualitative methods can help to fully reveal both expected and unexpected reasons for differences between the wards.*

Analysing the reasons for the different reactions will help lead to a better understanding of the factors that lead influence the successful introduction of a computer-based nursing documentation system. Both quantitative analysis and qualitative analysis have a role in this information system evaluation.

## 1. Introduction

Nursing documentation is an important part of patient-oriented clinical documentation. Due to frequently mentioned problems, computer-based documentation systems are often introduced to improve the quality of documentation and reduce documentation effort. Frequently, evaluation studies accompany the introduction of computer-based nursing documentation, aiming at analysing the positive and negative effects of such systems (e.g., [3], [4], [5]). The evaluations often show quite diverse effects. In particular, the reactions of the nursing staff to a computer-based nursing documentation can be quite different.

At the Heidelberg University Medical Centre, we introduced a nursing documentation system on four wards and systematically evaluated its effects in a two-year study. We found different reactions on the wards. In this paper, we will first take a look at the quantitative results of our evaluation study and discuss possible reasons for the detected differences. We will then argue that only qualitative methods can help to fully describe both expected and unexpected reasons for differences between wards.

## 2. Methods of Quantitative Analysis

The overall aim of the study was to evaluate the effects of computer-based nursing documentation with special emphasis on acceptance issues. The software PIK was chosen for the study and introduced on four wards of three different departments of the University Medical Center of Heidelberg, Germany. One aim of our study was to see how the various acceptance scores change during and after the introduction of a computer-based nursing documentation system. We analyzed the acceptance of the nursing process, of computers in nursing, and of the introduced computer-based nursing documentation system. The complete study design is presented in [1]. Preliminary results have been presented in [2].

A prospective intervention study with three time measurements was conducted: 3 – 4 months before introduction (1<sup>st</sup> questionnaire; return ratio 82%); 3 – 4 months after introduction (2<sup>nd</sup> questionnaire; 86.5%); approx. 9 months after introduction (3<sup>rd</sup> questionnaire; 90.2%), mainly using validated questionnaires. All in all 119 questionnaires were returned: 23 nurses answered all three questionnaires, 17 nurses answered two (including the staff of ward B which only received two questionnaires), and 16 nurses answered one questionnaire. Due to organizational reasons, no 2<sup>nd</sup> questionnaire is available for ward B.

## 3. Background Information on the Study Wards

In order to be able analyze our quantitative findings, it is important to have some background information on our study wards. Three of the four wards had been selected by the nursing management for the study. On all three wards, the majority of nurses agreed to participate. Ward B volunteered by themselves to participate. Various computer-based clinical application systems have been in use for years on all four wards, such as systems for patient administration, material ordering, staff scheduling, ward management, intranet/internet and electronic mail. The four study wards belong to different departments.

- Ward A: Psychiatry; 21 beds; 20.7 days mean duration of stay; 19 nursing staff members.
- Ward B: Psychiatry; 28 beds; 13.7 days mean duration of stay; 17 nursing staff members.
- Ward C: Pediatrics (children under 2 years); 15 beds; 4.5 days mean duration of stay; 13 nursing staff members.
- Ward D: Dermatology; 20 beds; 9.6 days mean duration of stay; 12 nursing staff members.

Our study wards were quite different with regard to nursing process documentation. On wards A and B, it had been established for several years. In contrast, on ward C and D, only a reduced care planning was usually documented. Documentation was mostly conducted in the ward office. Only on ward C, major parts of documentation were also conducted in the patients' room.

At the beginning of the study, most of the nurses were between 20 and 39 years of age. On ward A, two nurses were older than 39, three on ward B, four on ward C, and one on ward D. The youngest staff could be found on ward D. Some of the nurses had prior computer experience, but none had worked with computer-supported nursing documentation systems beforehand. The mean self-confidence with computers, on a scale from 1 (= insecure) to 4 (= secure), was lowest on ward C (2.2), medium on ward A (2.45) and B (2.33), an highest on ward D (3.00). All wards were sufficiently equipped with computers: two in the ward office, and one in an additional staff room. Sufficient training (usually 2 – 3 hours in small groups) was provided for all nurses. On every ward, motivated

nurses were specially trained as key-users. In addition, all other health care professional team members (such as physician) received an introduction to the computer-based documentation system in order to have access to the records.

Computer-based nursing documentation systems allow the storage of pre-defined problems, aims, tasks and care plans in order to support an efficient nursing care planning. Before the introduction of PIK, the wards organized a coordinated development of those items. Before the introduction, about 36 psychiatric, 23 pediatric, and 12 dermatological care plans were prepared.

#### 4. Results of Quantitative Analysis

Table 1 shows the results of the acceptance measurements. A detailed analysis of the answers of the nurses revealed negative effects especially on ward C. On both wards C and D, the nurses stated that the documentation system does not save time, and that it does not lead to a better overview on course of patient care. In addition, on ward C, the nurses stated that they felt burdened in their work by the computer-based system, and that the documentation system does not make documentation easier. On ward A and B, the opinions were more positive.

Table 1: Mean of three acceptance scores (1 = lowest acceptance, 4 = highest acceptance) of the four study wards for each of the three measurement points (T1 = before introduction, T2 = during introduction, T3 = after introduction of a computer-based nursing documentation system). Only answers from nurses that answered all three questionnaires are included.

	Acceptance of nursing process			Acceptance of computers in nursing			Acceptance of the new computer-based nursing documentation system		
	T1	T2	T3	T1	T2	T3	T1	T2	T3
Ward A	2.92	2.96	3.18	2.70	2.83	3.00	--	2.80	3.40
Ward B	3.36	--	3.21	3.03	--	3.30	--	--	3.64
Ward C	2.78	2.00	2.53	2.43	2.04	2.65	--	2.17	2.33
Ward D	2.94	3.03	3.15	2.91	3.04	3.17	--	3.25	3.75

The self reported daily usage of the computer-based documentation system was quite similar on all wards: about 1 – 2 hours/day during the 2<sup>nd</sup> and 3<sup>rd</sup> questionnaire, with highest values on ward B, and lowest values on ward A. The self-confidence with the system as stated by the nurses was rather high during both the 2<sup>nd</sup> and 3<sup>rd</sup> questionnaire: the mean values were between 3.00 and 3.67 during the 2<sup>nd</sup> questionnaire, and between 3.43 and 3.78 during the 3<sup>rd</sup> questionnaire (1 = minimum, 4 = maximum).

Statistical analysis revealed that the overall acceptance of the documentation system during the 3<sup>rd</sup> questionnaire was positively correlated to the initial acceptance of the nursing process, to the acceptance of computers in general and to the acceptance of computers in nursing. Both computer acceptance scores were in turn positively correlated to the years of computer experience.

#### 5. Interpretation of the Results

On most wards, the acceptance scores were already high in the beginning, and then even increased during the study. However, on ward C, the results revealed negative reactions, showing a heavy decline in the acceptance scores during the 2<sup>nd</sup> questionnaire. On ward C, the overall acceptance of the computer-based system remained low, even during the 3<sup>rd</sup> questionnaire. What could be the reasons?

The introduction of the computer-based system, regarding training and support, was quite similar on all four wards. The reported daily usage of the system, and the self-confidence with its use, were also quite equal on all wards. However, there are some important differences in the preconditions of the wards. The nursing process had only been documented partially on wards C and D. The introduction of a computer-based nursing documentation system increased documentation, since it forced more complete documentation. Therefore, both wards complained about an increase in time effort. However, the overall acceptance was high on ward D. On ward C, there must be further factors leading to the negative acceptance scores. A further analysis points at the following factors: documentation of nursing tasks covered a 24 h/day, due to the young patients (mostly infants) and their high need for care. Thus, the overall amount of documentation is higher. In addition, patient fluctuation of is also highest on ward C. For each patient, a complete nursing anamnesis and nursing care plan must be established, which is more time-consuming than it had been before. Also, the computer experience is rather low on ward C. Compared to ward D, the nurses have a higher age. Older nurses may not have been prepared sufficiently in the theory and practice of using the nursing process. In addition, older nurses, with many years of nursing experience, may not have been so eager to adapt to new ways of documentation, fearing increased time efforts and reduced time for patient care.

Another difference is the number of motivated key users. While ward D had 3 – 4, ward C had only one. Also, on ward C, during the introduction of the nursing documentation system, the workload was rather high due to staff shortage. Finally, on ward C, nursing documentation had previously been carried out in the patients' rooms. However, during our study, computers were only installed in the ward office. No mobile computers were available, which lead to double documentation. Overall, the nurses on ward C were quite disappointed with the computer-based nursing documentation system. They questioned its usefulness in the beginning. This did not only lead to low acceptance scores of the documentation system, but also to a heavy decline of the acceptance scores of the nursing process in general, and of computers in nursing, in the 2<sup>nd</sup> questionnaire.

However, the scores increased again during the 3<sup>rd</sup> questionnaire on all wards, including ward C. Obviously, the wards (especially wards C and D) learned to adapt the system to their needs. For example, the first results of a documentation analysis show that the size of care plans was largely reduced during the course of the study, leading to more, but more manageable care plans. Organizational changes lead to nurses charting not only at the end of a shift, but also in between. In addition, due to the transparency of their daily work, which the computer system could now demonstrate, the nurses' attitude to nursing documentation in general also improved (see Table 1). The nurses also became more self-confident in using the computer. In the end, all wards decided to continue working with the computer-based documentation system, which is now running routinely on all four wards.

All of the discussed factors may have lead to the different acceptance scores on the wards. However, we are not sure about the hypothesized factors, since the quantitative analysis is not sufficient to yield clear statements about the real factors and about their weight. In order to receive more valid statements about both expected and unexpected factors influencing the acceptance of a nursing documentation system, we are now executing further qualitative analysis. Both individual interviews and group interviews will be conducted and qualitatively analyzed to find the reasons for the different acceptance scores.

## 6. Conclusion

Although the introduction of the new nursing documentation system was similar, we detected different reactions on the wards. There seem to be different distinctive features that influence the acceptance of such systems. Quantitative analysis can help to quantify such factors, but only if they are previewed and included in the study (such as computer knowledge, or fluctuation of patients). On the other side, a qualitative analysis can help to initially find both expected and unexpected factors that can influence the introduction. It thus leads to a deeper understanding of the preconditions and effects.

Summarising, both quantitative analysis and qualitative analysis have a role in information system evaluation. While quantitative analysis helps to find quantifiable answers to predefined questions, qualitative analysis helps to better understand the complexity of the different factors that influence the introduction and acceptance of computer-based documentation systems.

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