Use of electronic information systems in nursing management

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Abstract

Purpose: The purpose of this study is to describe nurse managers’ perceptions of the use of electronic information systems in their daily work. Several kinds of software are used for administrative and information management purposes in health care organizations, but the issue has been studied less from nurse managers’ perspective.

Methods: The material for this qualitative study was acquired according to the principles of focus group interview. Altogether eight focus groups were held with 48 nurse managers from both primary and specialized health care organizations. The nurse managers were asked in focus groups to describe the use of information systems in their daily work in addition to some other themes. The material was analyzed by inductive content analysis using ATLAS.ti computer program.

Results: The main category “pros and cons of using information systems in nursing management” summarized the nurse managers’ perceptions of using electronic information systems. The main category consisted of three sub-categories: (1) nurse managers’ perceptions of the use of information technology; (2) usability of management information systems; (3) development of personnel competencies and work processes.

Conclusions: The nurse managers made several comments on the implementation of immature electronic information systems which caused inefficiencies in working processes. However, they considered electronic information systems to be essential elements of their daily work. Furthermore, the nurse managers’ descriptions of the pros and cons of using information systems reflected partly the shortcomings of strategic management and lack of coordination in health care organizations.

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1. Introduction

Three elements are essential in the use of information technology in health care: organization, individual and information systems. Health care is a complex environment for information technology due to rapid changes in the operating context [1]. For example, organizational structures, culture(s), resources available and management are factors with an impact on the implementation and use of information systems. Furthermore, individual attitudes, competencies and information needs are connected to the use of information systems [2,3]. Finally, the usability and integration of electronic information systems into the work processes affect the activity of use among health care workers [4,5]. Simpson [6] argues that making the most of health information technology requires proper nursing management. For a nurse manager, managing technology is a matter of managing the three ‘Ps’: people, processes and programs in addition to managing their own competencies.

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The purpose of this article is to describe nurse managers’ perceptions of electronic information systems in their daily work. The focus is on a general description of using information systems rather than of the use of a single information system.

2. Background

A great number of diverse information systems are in use aiming at improving efficiency of health care services (e.g. Refs. [7,8]). So far, the emphasis has been on the development of electronic patient records (EPR) which can provide information for managerial needs, too, rather than in developing management information systems [9]. For example, in Finland, the development and implementation of EPR has been emphasized in national policies. However, a prerequisite for using clinical data for managerial purposes is that nurse managers identify their information needs related to management, not only for patient care [10].

The content of nurse managers work varies from clinical practice to management functions, (e.g. planning, organizing, staffing, budgeting, coordinating care and communicating) and they spend their time on these tasks to varying extents (e.g. Refs. [11,12]). Nevertheless, nurse managers need timely and accurate information for decision-making in order to cope in changing and challenging health care (e.g. Refs. [13–15]). Concurrently, nurse managers need information for different purposes, for instance, strategic management, human resource management, financial management and clinical management. In addition, the importance and role of the different information needs is dependent on the level of organization in which nurse managers work. They need different kinds of information at the strategic level than at the middle or operational levels of the health care organization. Furthermore, different educational backgrounds have an effect on information needs. Therefore, it is difficult to exactly identify the information needed in decision-making and problem solving even among nurse managers [2,16-18].

According to Ruland [19] nurse managers often lack the necessary information and decision-making support to manage their responsibilities effectively. Current information systems do not fully serve the needs of management; instead they provide data for managing clinical processes such as patient-related data [13,15]. However, effective nursing management is heavily dependent on the up-to-date and efficient use of information requiring the integration of a number of patient, staff and economic variables and enhanced evaluation, for example, of the effectiveness of nursing interventions in outcomes and the comparison of services across different settings [14,20]. Nurse managers estimated that information systems would benefit them most by providing information for the planning of performance, follow up and evaluation and for the planning and management of organizational changes as well as for nursing resource allocation [15].

Skills and competencies to use different kinds of information systems are an essential element of nurse managers’ competencies. The need for health informatics competencies has grown among health care managers, especially due to large number of information systems used in health care organizations and the lack of health informatics education. Thus many nurse managers may be not adequately prepared to lead the use of health information technology (HIT) in addition to the fact that they do not have sufficient skills and competencies to use information systems themselves [3]. The lack of informatics competencies leads to lack of abilities to effectively use information and to manage its use and thus to derive real benefit from the systems.

Electronic information systems can support nurse managers in their daily work, but they have to meet certain requirements in order to be useful. Based on the results of reviews [4,21] there are six dimensions of success which concern nurse managers. First proposed by Delone and McLean [4] the six distinct categories of management information systems are: system quality, information quality, usage, user satisfaction, individual impact and organizational impact. System quality and information quality affect usage and have a joint influence on user behavior. The evaluation model used by Delone and McLean [4] was utilized by van der Meijden et al. [21] who assessed evaluation studies of patient care information systems in order to determine the attributes used to assess the success of these systems. Regarding system quality the most often mentioned attributes in the studies reviewed concerned time or time savings. The information processed by systems should be complete and accurate, the qualities which are connected to data input and usage which also correlate with user satisfaction. Information system implementation also has an individual impact which may lead to desired changes in clinical work patterns. [21] However, when users are forced to change their practices according to information system implementation, it will impair the acceptance of the system [2]. The influence of systems on organizational aspects, i.e. collaboration, patient care or costs are often stated as objectives of implementation. Communication or collaboration with other disciplines seemed to improve when information exchange was facilitated through an information system instead of phone calls. Information systems have also had an impact on more efficient work routines and in cutting costs through time savings [2,3,21].

In summary, nurse managers’ information needs vary according to the content of their work, the organizational level at which they work and their education. They require adequate information provided by the electronic information systems in order to accomplish their tasks. However, obvious deficiencies have been noted in nurse managers’ IT skills and competencies concurrently with deficiencies of information systems. On the basis of previous literature it is known that several attributes promote the usage of information systems. Further, there is research on information system implementation and electronic patient records, but information system research from nurse managers’ perspective is less common. There is only little evidence on how nurse managers perceive information systems and their management as a crucial part of their daily work.

3. Materials and methods

The material was acquired according to the principles of focus group interviews in spring 2007. Both first-line and middle-
level nurse managers from primary and specialized health care units participated in the interviews. Altogether eight focus groups interviews were held in eight organizations, with 3–8 participants each (N = 48). The interviews took 2–3 h per focus group. The interviews were recorded in their entirety and transcribed verbatim. In addition, research notes were taken during the interview. In all focus groups there were at least two researchers present. One researcher facilitated the discussion, i.e. by introducing the purpose and rules for the focus group, kept the discussion to the agreed themes and managed the group dynamics, for example, by asking all the participants to share their opinions on specific issues. The other researcher acted as a co-researcher, i.e. she organized the focus groups in practice, took care of recording the interviews and took notes during the discussions [22–24].

The nurse managers were selected to participate in the interviews according to the following criteria. They represented units already enrolled in an earlier stage of this study; they were familiar with the issues of human resource management and especially the role of informatics in management, and they were willing to participate in the focus group. Unlike some other cases using focus groups [24] we had no difficulties in persuading the interviewees. Altogether six main themes were discussed in the interviews; one of which was electronic information systems and their use in the nurse managers’ daily work. This article reports the results of this theme only.

Research permission was acquired from the health care organizations according to their procedures and such permission was granted. Furthermore, interviewees’ anonymity individually as well as the organizations’ anonymity were guaranteed throughout the research process. The interviewees were told that they could drop out at any time during the research process. And finally, they had an opportunity to add, alter or remove their opinions and statements afterwards by email. However, none of them used this opportunity.

As this article reports only a part of a more extensive material, the group interaction was not the focus of the analysis as it would normally be in focus groups [22,23]. The data analysis was done using inductive content analysis with an emphasis on the content of the discussion. A computer program for qualitative analysis (ATLAS.ti) was used in the analysis. The main category “pros and cons of using information systems in nursing management” consisted of three sub-categories: (1) nurse managers’ perceptions of the use of information technology; (2) usability of management information systems; (3) development of personnel competencies and work processes.

4. Nurse managers’ perceptions of the use of information technology

Nurse managers widely accepted the use of computers and electronic information systems as essential elements of working processes. They also mentioned that information technology has been emphasized in their health care organizations’ strategies. This emphasis was evident, for example, in plans for continuing education which clearly aimed at improving IT skills, and in plans of action which included steps for the implementation of electronic patient record. Due to this strategic emphasis, the nurse managers had an opportunity to have a representative of nursing involved in the IT implementation at organizational level.

“This year’s nursing strategy focuses on electronic documentation (SCNM)”

“We have a representative of nursing in the project group and it has clearly benefited us (SCNM1). … We have been updated all the time (SCNM2)”

The nurse managers identified several preconditions for use, for example sufficient number of computers in the unit, peaceful places to use the computers, basic computer skills of the personnel, appropriate access to electronic information systems and adequate computer support services. They felt that all staff members and managers too ought to use IT systems. Concurrently, nurse managers were worried about an excessive “IT addiction” in current health care practices. Computers and electronic information systems had become so essential that in the event of a breakdown, all the clinical procedures ceased, too.

“In our organization, information system X has been implemented and in fact, we are obliged to use it (PCNM).”

“And there is always the question of how dependent we are on IT systems. If there is a power failure, nothing is working and you can’t get the computer on, then, in principle, we are unable to take care of our patients, since we do not have access to patient information (PCNM).”

The nurse managers used several electronic information systems and opportunities in order to fulfill their management functions (e.g. planning, organizing, staffing, and reporting). They had systems for (1) human resource management such as information systems for rostering, continuing education and recruitment; (2) financial management such as information systems for budgeting and travel management; (3) operational/clinical information systems such as electronic patient records; (4) information systems for communications and information sharing such as Internet, Intranet and email. These systems were designed for professional use only within the organization, since a few health care organizations utilized information technology in order to meet their clients’ needs. Furthermore, some health care organizations lacked Internet pages and, therefore, they were invisible, for instance, to potential new employees.

“Sometimes you get funny comments from your staff: it would be nice to sometimes see the manager face-to-face as opposed to having plenty of emails with deadlines for different tasks. (PCNM)”

“Information on our organization or vacant jobs cannot be found in the Internet. We do not have Internet pages, though they were supposed to be in use a year ago. (PCNM1). Really embarrassing (PCNM2)”

“A specific group of clients use email, they ask for help and make appointments and they will get feedback for their care via email (PCNM)”

The use of information systems has both benefits and weaknesses from the nurse managers’ perspective. Nurse managers considered that the use of information systems has
strengthened their role as managers. Furthermore, information systems have enabled them to fulfill their management tasks more easily. Nevertheless, there were some weaknesses in relation to the use of information systems. In health care organizations, the use of information systems was not common among the nurse managers, and not all the nurse managers used the systems. Even in the same organization, information systems were fragmented, in other words, some wards had the opportunity to use the information system or they had even made their own applications for certain purposes, e.g. Excel-based systems. A problematic feature was the parallel use of both conventional and electronic versions, which has led to inappropriate use of working time.

“Considering the existing IT systems in our organization, I found them good and they help us to decide the direction for management. (PCNM)”

“I would say some of the first-line nurse managers use them and some of the managers do not use. (PCNM)”

“We have made a competency register for our own staff, but it is not in common use throughout the hospital. Earlier it was. (SCNM)”

Furthermore, the nurse managers were somewhat disappointed at the costs of IT systems, since they thought that IT systems consumed a lot of money compared to the benefits, but when they asked for money for human resources, they did not get it.

“IT systems have caused a lot of extra expenses, but when considering from the point of view of patient care, the benefits have been insignificant. (PCNM)”

In the future, the nurse managers predicted that the use of information systems would increase. Information systems will help patient care especially (e.g. patient monitoring, patient guidance, reminding nurses of certain tasks), but it will also help to standardize the care practices. Patient care documentation will become easier due to the use of bar codes and electronic identification cards. An interesting feature in future visions was that the nurse managers did not identify uses of information systems for managerial purposes in future, but they reflected on the issue merely from a clinical perspective.

5. Usability of management information systems

Nurse managers evaluated the usability of information systems quite critically. Usability was divided into two categories: barriers to use related to information content and barriers to use related to information systems (Table 1). Although the nurse managers used electronic information systems and considered them useful in terms of management, they found that information systems did not contain the information they needed. Nurse managers especially missed information for human resource management and outcomes evaluation. But, they also recognized that they had not identified their information needs.

“I would like to have information on outcomes of patient care: it is really difficult to get at the moment. (PCNM)”

When there was relevant information in information systems, it was difficult to access due to the complexity of the system or lacking rights to use it. In addition, some follow-up data was not updated data, but described the situation 2 or 3 months ago. The nurse managers were not always sure whether the data they had put into system was available for others and, therefore, they questioned the validity of the information. Moreover, information was difficult to combine in order to, e.g. see personnel data and financial data at the same time. Therefore, nurse managers considered that the information systems did not fully support management and decision-making.

“... well I have access to information, I have such a system that I can follow the financial information. But I can’t see statistics, e.g. on human resources. I have to ask for them separately. (PCNM)”

There were also some other problems related to information systems. In health care organizations, there were different versions in the use of the same system. Furthermore, the nurse managers used several information systems at same time. Sometimes, the systems were still in their infancy and the firms developed the systems concurrently with the use. This caused frustration, since the systems were clumsy to use. Finally, a lack of long-term planning for information systems was a typical feature for health care organizations; information systems needed were closed down and in some cases the systems were even haphazardly changed.

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<th>Table 1 – Barriers of use related to information content and information systems perceived by nurse managers.</th>
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<td><strong>Barriers to use related to information content</strong></td>
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<td>Information was not updated</td>
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<td>Information needs were different than information available in information systems</td>
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<td>Information needs were not identified</td>
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<td>Non-valid information</td>
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“They (IT systems) are implemented in raw versions... in our organization, many raw versions have been implemented and they cause a lot of problems, suddenly, in some part of the organization, there is a blackout. Still, we pay a lot of money for the system, and therefore, we hope that they would be well-designed or at least it would take only short time period to get them operational. This has been really hard in recent years. (PCNM)"

“The money ran out and the IT system was changed (PCNM).... We did not like to give it up, since it really helped us (PCNM2).... And we did a lot of work in order to develop it. (PCNM1)"

6. Development of personnel competencies and work processes

Implementation and use of information systems posed several challenges to nursing management. The nurse managers described the challenges from four perspectives: manager, employee, atmosphere, and changing working processes. The nurse managers found that they had a significant role in the implementation and use of information systems. Therefore, it was very important that they were competent in terms of information technology. Their own attitudes and skills in using the information systems were considered as an example by the employees. They showed an example by actively using computers and learning information systems together with their staff.

“I had to do it myself, too. My own example was a good incentive. You sit besides the employee on the computer all day if needed. (PCNM)"

An important aspect from the management perspective was managing the competencies of employees. In fact, the nurse managers were more worried about their staff members’ skills and competencies than their own in terms of using computers and information systems. The competencies and especially the deficiencies in competencies had to be recognized. The nurse managers had to be sensitive to the individual needs of employees and they had to promote their development. In order to commit the employees to using computers and learning information systems, the nurse managers were expected to identify and clarify the meaning of information systems to the work processes and to justify the use of information systems in the work processes. Learning and using the information systems was supposed to take place in a positive and encouraging atmosphere. The nurse managers’ duty was to promote such an atmosphere, which also allowed learning by trial and error.

“We have had a common attitude that we will learn to use it together. (PCNM)"

“I think that if you make it (the use of IT) secure, so that the employee feels safe, then the employee can learn almost everything. (PCNM)"

Changing working processes required a strong managerial orientation from the nurse managers. Changing working processes required reaching agreement on the new processes, commitment to using them and the implementation of new processes. The nurse managers had some means to promote the formulation and implementation of new working processes: piloting an electronic information system, the establishment of an implementation project, creating different kinds of support systems and training. Conflicts between the nursing and medical profession caused most problems in commitment and implementation. The nurse managers had quite negative attitudes toward the medical profession, they were considered to have the most resistance of change and, therefore, they increased the workload of the nurses. However, the nurse managers considered that nurses had quite positive attitudes toward IT in general and they were willing to learn. Sometimes these conflicts even led to dysfunction in the health care organization when the implementation of a new working process was not successful or the new working process was implemented in part causing increases in workload due to parallel uses of old and new working processes.

“And there are all these issues related to electronic patient records. There is a war between doctors and nurses. Like the doctors say; there lives a secretary inside every staff member when they feel that they have to take care of all the secretaries’ and nurses’ tasks. The nurses feel that they have to do all the doctors’ work. This is the mood nowadays. It started last year and it goes on. (SCNM)"

“I can’ get the information out of the system, although I know how to do it. Therefore, other people have to be involved in this, though one person could do it, in theory. It takes a lot of time from both of us. (PCNM)"

“Our staff is aging and I wondered when EPR was implemented how I could cope with my staff. But, our enrolled nurses took it as a matter of honor that they documented patient care themselves in the system. (SCNM)"

Furthermore, nurse managers considered that the implementation of IT has increased their workload due to the following reasons: too many information system implementation projects at the same time, lack of time and feelings of haste, and decreasing support systems and services (e.g. support personnel). In order to cope in this situation they need to learn a lot of new working practices using new information systems. This has led to feelings of frustration and exhaustion, too.

“A lot of time is spent on computers... it is all away from the managerial job. (PCNM)"

7. Discussion

7.1. Discussion on the results

The purpose of this study was to describe in general nurse managers’ perceptions of the use of information systems in their daily work. The nurse managers described this by focusing on the use and usability of information systems, and the development of personnel competencies and work processes.

In general, many of the problems that the nurse managers described reflected the shortcomings of coordination and
strategic management in health care organizations. Despite the fact that IT was emphasized in strategy, a common feature was lack of coordination at operational level. There were several indicators of this in these results. The underutilization of IT options in health care was a reflection of the shortcomings of strategic management. Information systems were primarily focused on professional use only and potential clients and employees were not able to use any systems to contact or to obtain information on the organization. However, this is a crucial question of the image and attractiveness of health care organizations in the era of diminishing workforce and ever-increasing client needs.

In this study, the nurse managers’ descriptions of the content and utilization of information systems varied in the organizations, which led to several problems in information technology use [25]. Information systems did not meet nurse managers’ information needs, as has been reported in earlier studies [15,19] and they were used haphazardly. Regarding the development and implementation of systems this leads to the question: who coordinates the entity of information systems/HIS in health care organizations? Have nurse managers participated actively in the development processes in health care organizations? Have their information needs been analyzed? In this study, a good practice was found in one health care organization, where nurse managers were involved in development processes. The nurse managers found that they were adequately informed and involved in this process via their representative [26].

The nurse managers interviewed in this study complained that the information systems were not ready to use and they did not support management in daily practice to their full potential. In health care, the culture seems to be still to train people to adapt to poorly designed technology, rather than to design technology to match people’s characteristics [27]. Furthermore, the nurse managers mentioned increased workload related to electronic information systems, which had led to parallel use of conventional and electronic systems as well as old and new working processes. Immature information systems have led to inefficient working processes [27,28], although it has been widely discussed that Information Systems make, e.g. work routines more efficient. However, the nurse managers were keen to change the working patterns in their units. They also considered that their personnel would benefit from the use of information systems.

More active communication or collaboration with other disciplines has been seen as a benefit of information system implementation [21]. However, on the basis of the results, there was some interdisciplinary lack of commitment. Furthermore, the information systems collaboration was not improved and some conflicts between professions were reported.

The nurse managers’ perceptions of the use and usability of information systems were similar to those reported in previous studies (e.g. Refs. [21,28]). Time savings or lack of time was considered a downside for information system usage. In earlier studies, user satisfaction has also been regarded as an important factor correlating with the quality of information [21]. Nurse managers were somewhat hesitant whether information systems were beneficial in terms of their management work. On the other hand, they considered that the use of electronic information systems strengthened and enhanced their management role. On the other hand, they thought that the use of electronic information systems took too much time from management work.

In summary, this study partly strengthened the views and results already known on the basis of earlier studies concerning the challenges and problems related to information systems as well as individuals’ skills, competencies and attitudes. Furthermore, the organizational aspect (e.g. work processes, general view of information systems in daily work and coordination) was emphasized in this study. In future, it would be beneficial also to focus research and development on organizational issues, as the individual challenges and problems will decrease while younger generations enter health care. Taking full advantage of IT requires both management and coordination at different levels of organization and re-design of work processes [5]. As Simpson [6] noted, managing technology is a matter of managing the 3 Ps. In light of these results, one more P could be added to the list. For the nurse manager it is managing 4 Ps: people, process, programs and plans (meaning strategic planning and coordination, implementation of strategic plans, and gaining a holistic view of information systems at the unit and/or organizational level).

7.2. Credibility of the study

Focus groups were used here as a material collection technique. The material gathered was rich and provided valuable information on the current situation from the nurse managers’ perspective. The focus groups were homogenous, and therefore it was assumed that the group members felt confident in expressing their views [23]. Although the focus of analysis was not on the interaction between the group members, in two focus groups the discussion was dominated by one person [22]. The problem was solved by asking everyone to express their view on a specific topic, but it can be questioned whether the opinion was really their own or if they merely reiterated the “official” opinion.

The credibility of this study is evaluated by four criteria presented by Lincoln and Guba [29]. Transferability of these results is limited except for similar contexts in Finland, although the earlier literature gave support to some of the findings of this study. Credibility refers to the researchers’ ability to capture the interviewees’ reality. In this study researcher triangulation as well as peer debriefing were used to improve the credibility. Furthermore, multiple focus groups were conducted. In order to maintain dependability the research process was carefully described and documented. Although the researchers are not neutral toward their research subject according to qualitative methodology, confirmability was ensured in this study by keeping research notes and discussing the choices with researchers at different steps of the study.

7.3. Suggestions for further studies

These results raised some ideas for further studies. Due to the fact that the use of information systems seemed
Summary points
What was already known about the topic?

- Information systems are essential elements of all kinds of work processes in health care and, therefore, ability and competencies to use information systems are crucial.
- The success of information system implementation has several attributes, e.g. timing, resources, and information quality.
- Nurse managers need different kinds of technological tools in daily management.

What this study added to our knowledge?

- Present electronic information systems do not offer valid and accurate information for daily management in nursing.
- Implementation of immature electronic information systems and parallel use of both electronic and paper based systems cause inefficient work processes.
- Lack of coordination and strategic management of information systems were also detected by nurse managers as haphazard use and changes of information systems.
- Electronic information systems were seen as a shared effort of learning and development of practices among nurses and nurse managers.

to be quite uncoordinated at operational level, it would be very interesting to find out how nurse managers participate in electronic information system development and implementation processes. Carney [26], for example, has noted that nurse managers’ participation in strategy processes is crucial for commitment and implementation. Furthermore, more information is needed on the detailed use and benefits of electronic information systems in nursing management as well as on the competencies of nurse managers to use and manage the use of electronic information systems in nursing. Nurse managers’ varying information needs at different levels of organizations are likewise worth studying.

Authors’ contributions

JL, TK and KS all drafted the article and designed the study. JL have gathered the data and JL, KS and TK has analyzed and interpreted the data.

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