Nurses' experience of using electronic patient records in everyday practice in acute/inpatient ward settings: A literature review

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Abstract
Electronic patient record (EPR) systems have a huge impact on nursing documentation. Although the largest group of end-users of EPRs, nurses have had minimal input in their design. This study aimed to review current research on how nurses experience using the EPR for documentation. A literature search was conducted in Medline and Cinahl of original, peer-reviewed articles from 2000 to 2009, focusing on nurses in acute/inpatient ward settings. After critical assessment, two quantitative and three qualitative articles were included in the study. Results showed that nurses experience widespread dissatisfaction with systems. Current systems are not designed to meet the needs of clinical practice as they are not user-friendly, resulting in a potentially negative impact on individualized care and patient safety. There is an urgent need for nurses to be directly involved in software design to ensure that the essence and complexity of nursing is not lost in the system.

Keywords
computers, electronic records, nurses' experience, nursing documentation, patient care

Introduction

The electronic patient record (EPR) has evolved to play a major role in healthcare in modern society. Within the EPR, nursing documentation is a key element as nurses provide round the clock care and constitute the largest group of healthcare workers. Yet, the involvement of nurses in the design of the EPR has been negligible [1]. Subsequently, there are indications that the suitability of the EPR to nursing documentation in everyday practice may be less than adequate, suggesting serious and urgent implications for patient safety in hospital wards today [2] (non-published observations from a Swedish study).

Documentation has always been an essential part of professional caring. Before the days of written records, wisdom was conveyed by word of mouth to future generations. With the evolution

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of the written word, it still took centuries for written records to be kept in hospitals. In the early 1800s doctors kept some records in ward notebooks, and in the 1850s, during the Crimean War, Florence Nightingale kept the first patient-oriented health records[3]. Advances in technology and medicine have influenced the role of the nurse, and the evolution of nursing theory and research has entailed change in the way that nursing is processed and documented. This, as well as increased ethical and legal awareness, has resulted in the need for more accurate and complete record keeping. Hence, the old cliché 'if it isn't documented, it isn't done' still remains in vogue and the main reason for keeping records is still to promote safe, high-quality patient care[4, 5]. Having a central role in coordinating care with other members of the multidisciplinary team, nurses' documentation plays a pivotal role in healthcare. Further, the Nursing and Midwifery Council (NMC) of the UK states that 'Record keeping is an integral part of nursing and midwifery practice'[5].

Nowadays, information and communication technology (ICT) has evolved to play a major role in healthcare, and while the transition from manual to electronic records creates opportunities to facilitate documentation, it also increases complexity. The EPR aims to improve patient safety and documentation quality[6] and to achieve these aims it is crucial that EPRs, besides having relevant and correct information, have a format that makes sense to the clinician, are well designed for documentation and are user-friendly[7]. In addition, users should see EPRs as a positive development and be satisfied with the system[1]; if they are not, there is a risk that they will be reluctant to use it[8]. As Clark[1] succinctly states, 'systems should be needs-led and not supply-driven'.

Despite this, a survey by the Royal College of Nursing (RCN)[9], in the UK in 2006, revealed that the confidence nurses had in EPRs had dwindled drastically compared to a similar study in 2004. Clearly, leaving nurses out of the consultation process not only works against acceptance of EPRs, but limits the possibilities for designing software that meets the requirements of nursing documentation in everyday practice. Bearing in mind that nurses are the largest group of healthcare workers, provide 24 hour care and have a key role in record keeping and patient safety, it is imperative that EPR systems are user-friendly and fit for the purpose of supporting everyday nursing practice. This review focuses on nurses in acute/inpatient ward settings where they have many patients in their care at any given time, diverse and changeable clinical situations, and a relatively rapid turnover of patients.

This article aims to examine nursing documentation in relation to how nurses experience using the EPR in everyday clinical practice in acute/inpatient ward settings. Two questions emerged from this aim. First, do EPRs support nurses in their everyday clinical practice? Second, are EPRs user-friendly?

Method

A search was carried out (Table 1) in Medline and Cinahl between February and April 2008, followed by a second search in March 2009. Subject headings were first sought singly and then in combination. A search was also conducted in ELIN@Kalmar (our university library search engine), in Cochrane and on the Internet, but no further results were detected. In addition a manual search was conducted in the reference lists of the articles obtained. Inclusion criteria were original peer-reviewed articles related to nurses in acute/inpatient ward settings, written in English or Swedish, from 2000 to 2009. Initially, references were selected from titles and abstracts; 21 potentially relevant articles were chosen.

Following further reading of full text articles, three articles were rejected because they were reviews. Two articles were not available. Another 11 articles were rejected because they were not research articles and did not address the aim or meet the inclusion criteria.

Table 1. Flowchart of search

Stage	Number of articles
Cinahl: nurses, nurse attitudes, patient safety, user–computer interface, nursing records and computerized patient record[a]	191
Medline: nursing, staff attitudes, user–computer interface, nursing records and medical record systems, computerized[b]	515
Relevant articles retrieved and read in full text from Cinahl	15
Relevant articles retrieved and read in full text from Medline	3
Manual search in reference lists	3
Total relevant references	21
Rejected because reviews	3
Not research article, did not address the aim, did not meet the inclusion criteria	11
Not available from our university library	2
Rejected after quality assessment	0
Remaining articles included in the study	5

[a]Search in CINAHL using CINAHL headings.
[b]Search in Medline using MeSH terms.

Five articles remained. In order to assess quality a formal protocol was used, namely a tool from the Swedish Council on Technology Assessment in Health Care, adapted by Åkesson et al.[10]. According to the quality assessment in this protocol, all articles were awarded a grade of either medium or high by one of the researchers (JS) and therefore included in the review, with all of the authors in agreement regarding the quality. Consequently, five articles remained, two quantitative and three qualitative, and were included in the study (Table 2).

The selected articles were read and reread to allow the researchers to become immersed in the data. During reading a process of open coding was carried out whereby characteristics were given a code and written in the margins. These characteristics could then be categorized and grouped into themes and subthemes as related data became apparent[11]. Two authors (JS and PJ) coded the data and consensus on the themes was reached through discussion. In accordance with the aims, two themes were identified; 'Supporting nurses in everyday practice' and 'User-friendliness'. The theme of supporting nurses in everyday practice was complex and three subthemes were identified: bedside charting; individualized care, time and workload; and appropriateness of EPRs to nursing practice. To assist with analysis, we have considered user-friendliness as having both 'external' and 'internal' aspects; that is, whether a user has accessed the system in the computer or is still outside the system. Thereby, 'external' user-friendliness is related to availability, support, compatibility and accessibility. 'Internal' user-friendliness has two main features, namely navigability and overview; the latter is related to how easy it is to observe patient status at a glance and quickly access relevant patient information.

Results
The studies included two from the USA, two from Australia and one from the UK. The approaches of the studies varied; descriptive study, quasi-experimental design, individual interviews and focus group interviews (Table 2). The results are presented below in accordance with the afore-mentioned themes.

Table 2. Summary of analysed articles

Author, year, title and country	Aim	Method, data collection, analysis	Participants	Findings	Q[a]
Darbyshire (2000) [16] User-friendliness of computerized information systems. Australia	What are nurses' and midwives' experiences of using computerized patient information systems (CPIS) in everyday clinical practice?	Qualitative design. 13 focus group interviews over 6 week period Interpretive analysis	Nurses and midwives $n = 53$	Participants were critical of systems in almost all areas of user-friendliness, and said systems were cumbersome and problematic	I
Darbyshire (2004) [15] 'Rage against the machine?' Nurses' and midwives' experiences of using computerized patient information systems for clinical information. Australia	To explore clinical nurses' and midwives' perceptions and understanding of computerized information systems in everyday practice	Qualitative design 13 focus group interviews over 6 week period Analysis based on interpretive phenomenology	Practitioners, level I RNs to clinical nurse consultants and nurses in IT management $n = 53$	Digital disappointment. Computerization had not enhanced clinical practice, patient care or clinical outcomes	I
Moody et al. (2004) [12] Electronic health records documentation in nursing. USA	To assess the functionality of the current system and identify nurses' preferences for electronic documentation methods of clinical data	Descriptive, cross-sectional design Questionnaires Convenience sample analysis conducted using descriptive statistics; content analysis	Nursing personnel, including RNs, licensed practitioners and nursing assistants $n = 100$	Many thought that EHRs had resulted in decreased workload. Most preferred bedside documentation but reported that system and environmental barriers often prevent this. Many believed that EHRs improved the quality of documentation and would lead to improved safety and patient care	II
Smith et al. (2005) [14] Evaluating the impact of computerized clinical documentation. USA	To determine the impact of online documentation on staff attitudes, the time needed for documentation and completeness of documentation	Pre and post quasi-experimental design Questionnaire, observation, documentation audit Descriptive and comparative analysis	RNs (attitudes), $n = 46$ RNs (time) $n = 82$ Patient care elements, $n = 89$	Less positive attitudes towards computers post-computerization; time required for charting was unchanged; documentation was more complete	II
Timmons (2003) [13] Nurses resisting information technology. England	To establish whether computerized systems are resisted by the staff that are required to use them. If so, then in what forms, why, and how is resistance situated within a wider context of the nursing culture?	Qualitative study Random selection of wards in 3 hospitals. Semi-structured interviews Interpretive analysis	Ward nurses 'ordinary users' of system, and 3 project managers of the system $n = 31$	Systems were time-consuming; queues at terminals; too much down time; computers too far from the patient; lack of individualized care; resistance because of system design	I

[a]Q = quality assessment: I = high, II = medium.

Supporting nurses in everyday clinical practice

Bedside charting. Two papers highlighted the issue of charting at the bedside [12, 13]. Nearly all nurses preferred bedside charting for medications, vital signs, ongoing assessment data and progress notes [12]. In another study, most nurses felt that there was a problem of 'working away from the patient' in relation to care planning [13]. Paper-based systems allowed initial assessment and writing of care plans to be carried out at the bedside where the patient could be directly involved in the care planning. Subsequently, handwritten care plans could be left at the end of the bed where nurses and other health workers would have easy access to them. However, when computerized records were introduced, the physical distance between the patient and the computer meant that notes were first written on scrap paper or paper towels and later added to the computer record. This resulted in using duplicate methods of documentation and poor updating of care plans [12, 13].

Individualized care, time and workload. Regarding views on individualized care, time and workload, four articles covered this subtheme [12–15]. There were conflicting results regarding whether care planning allowed for more or less individualized care. Software utilized in the care planning process allowed for more individualization [14]. However, another study [13] found that the use of a model of nursing within the EPR could restrict care planning to some degree, and many nurses criticized the EPR for reducing the possibility of delivering individualized care as the pre-determined 'choices in the system were too broad to fit the patient'. Nurses tended to use the system as it stood, because individualizing the care plan involved an extra, convoluted, time-consuming procedure in an awkward system. Interestingly, a further view was that nurses could become deskilled in creating individualized care plans, thereby reducing the control that nurses had in planning the care process.

Using an EPR had not decreased the workload of nurses [12]. On the other hand, nurses found that the EPR reduced the amount of handwriting they normally had to do by not having to create care plans from scratch [15]. Sometimes nurses evaded updating plans on the computer due to lack of time, leaving this duty till the end of shift or for the next shift [13].

Appropriateness of EPRs to nursing practice. Two of the studies claimed that EPRs were not appropriate to nursing practice [12, 15]. Nurses claimed that the system did not 'reflect their practice' and reported that it was 'incapable of capturing much of what they believed was crucial in nursing care'. Regarding psychological care, nurses felt that they were trying to fit complex caring practice into systems unable to accommodate this, for example, the caring practice of emotional and psychological support. Since EPRs lack sensitivity, they fail to capture 'the being there stuff', for example, sitting at the bedside and holding the hand of a dying patient [15]. On the other hand, some nurses thought EPRs had improved documentation and said that in time it would have a positive effect on improving healthcare [12].

User-friendliness

All of the articles had strong opinions on the issue of user-friendliness [12–16]. In this theme, a recurrent complaint from nurses was related to time consumption. Regarding 'external' time factors, there were four main issues: waiting for a computer to become available, down time, logging in and technical support [12, 13, 16]. First, there could be problems such as lack of computers, with many nurses waiting for access when the ward was particularly busy. Second, sometimes the whole system could be 'down', where computers were not working at all. Third, there was often difficulty with logging on due to multiple passwords and user names. Lastly, most nurses found systems too slow and, if they needed to ask for technical assistance, helplines could take up to 2 hours on the

telephone [16]. However, one study found that technical help was always available [12]. Incompatibility between systems was another problem, for example where primary care and hospital care systems could not communicate with each other [15].

With regard to 'internal' user-friendliness, that is after the nurse has successfully logged in and accessed the EPR, a majority of nurses reported problems with navigability and could not get an overview of the patient [14, 16]. An example of poor navigability, which is crucial to user-friendliness, was when nurses were required to move frequently to new screens for each new documentation activity, sometimes involving 'labyrinth processes … to undertake the simplest of tasks' or '10 steps to get out and 10 steps to get back in' [16]. Nurses' attitudes were more negative post-computerization, particularly in areas of patient care and capabilities of computers [14]. Problems such as 'poor system navigability, lack of automatic prompts, slow system response and lack of an efficient way to view the overall picture of patient progress and care' were the main reasons for dissatisfaction [12–16].

Discussion

Nurses were generally dissatisfied with EPR systems for many reasons. The EPR does not support nursing practice because it does not give a good overview of the patient, is rarely available at the bedside, does not reflect nursing practice, does not support individualization and has a tendency to control the way in which nurses work. In addition, a majority of the participants in the studies in our review conceded that nurses found the actual computer systems were unreliable, slow, complicated, cumbersome and illogical. Clearly, the demands of clinical practice are not met by the current generation of EPRs.

Undeniably, there are some weaknesses in this literature review: primarily, the small number of studies greatly limits the reliability of the results. However, it seems there is an alarmingly limited number of studies on nurses' experience of EPRs in ward settings. Most studies on computer systems tend to study medical data and the system rather than how nurses experience working with them [17]. Moreover, studies on nurses' experience of EPRs are often from ICU settings which, in itself, is significant and points to the need for more research in the ward setting. The search covered the last 9 years and further studies may have been found if the search had been extended to cover a longer period. However, as technology develops rapidly we were keen to review the most up-to-date research, with the view that issues encountered in earlier years may have been addressed. In addition, efforts have been made to ensure reliability by following a step-by-step procedure as recommended by Polit and Beck [11], with each stage checked by a second author.

In acute/inpatient care settings, a clear overview of the patient is essential for all members of the multidisciplinary team, and not least for nurses. Despite this, the majority of nurses complained that it was difficult to get an overview of the patient in the EPR [2, 14, 16, 18]. Crucially, an overview of essential information such as vital signs allows the nurse to assess multiple variables and be alerted to early warning signs of any deviation from the norm [19]. However, if nurses are unable to document and view patient data in a way that makes it possible to assess these variables [18], then important relationships and trends might be overlooked. It is not enough to acquire patient data: they must be documented and presented in a way that supports the decision-making process. Indeed, it is the interaction of the nurse with this type of information that promotes high-quality patient care and thereby patient safety [19, 20]. Unfortunately, it would appear that in designing systems, minimal attention has been directed to the importance of overview in areas such as documentation of vital signs.

In addition, the physical distance between the point of care and the EPR runs the risk of inaccuracy when transcribing notes from scrap paper before reaching the EPR as well as time-consuming double documentation. Arguably, there could even be a case to retain paper flowsheets at the

bedside for this type of information, which could later be scanned into the EPR. Nevertheless, there may be room for optimism in this area, as a study by Bauer et al.[18] takes nursing into account in system design, and this kind of initiative might imply a more positive future for nursing documentation in the EPR.

Individualization of care has long been an important aspect of nursing, and some positive aspects of EPR are mentioned in the results[12]. However, with standardized care plans in the EPR, it is more likely that individualization is compromised. Although standardized care plans are also to be found in paper records, the difference is that whilst it is easy to alter a paper care plan, adjusting care plans in the EPR is both complicated and time-consuming[13]. Frankly, it is easy to imagine how nurses may feel pressurized to just use the standardized plan in the EPR when time is short. However, this is also an example of how nurses alter their routines to fit the system, rather than the system being tailored to suit nursing practice. Moreover, nursing is a very complex profession and, if nurses do alter normal practice in order to accommodate EPR systems with rather limited choices, there is a risk that patient care becomes less individualized.

In addition to the problem of less individualized care, there is a risk that nurses could actually become deskilled by adapting to the way systems operate rather than planning care from their own professional judgement, which is the core of professional practice[9, 13]. A further example of how computers can take precedence over nurses' professional judgement is when an EPR can give prompts in the case of patients who are at risk of developing pressure sores[21]. Another instance is in emergency departments, where automatic prompts can be used to remind nurses to retake vital signs. On the one hand these prompts could be regarded as deskilling nurses, but on the other hand they could also be considered to 'reskill' nurses by reminding them of important nursing interventions. 'High-tech' data-driven systems may be crucial in the future because of the projected shortage of nurses[22]. This is a rather alarming forecast, implying that there may be a risk that nursing will become more technical and less human, with nurses working like robots and providing computer-planned care unless computer systems are constructed to support and facilitate their work.

Furthermore, the EPR does not reflect clinical nursing practice in that rigid computer systems fail to accommodate complex caring practice, for example, the caring practice of emotional and psychological support[23]. Systems therefore lack the sensitivity to record the often undervalued caring practices of nursing[15]. Perhaps, with more input from nurses into the design of these systems, it would be possible to define some of these less discernible aspects of the profession such as 'compassion' – and why not some old-fashioned TLC or 'tender loving care'?

Clearly, EPR systems are not user-friendly[12–16]. Busy hospital wards with heavy demands on the time of nursing staff need to run smoothly and efficiently. Slow, complicated, illogical, cumbersome EPR systems are highly unlikely to be embraced by already overworked nursing staff. In the present review, results were inconsistent regarding time consumption, but the question arises that if time were to be saved by using an EPR, would this time be spent with the patient or would managers see this as an opportunity to employ fewer nurses? Unfortunately, administrators and managers seem to be convinced that the problems nurses have with EPRs are due to so-called 'technophobia', lack of training and resistance to change[13, 15, 16]. However, the real reason for their reluctance in accepting the EPR is directly related to the design of the system rather than to resistance to change. Thus, nurses adopt a position of 'resistant compliance'[13]. Moreover, problems experienced by these end-users may disappear as technology improves, but it seems that even the most sophisticated technology will 'fail in the absence of clear appreciation of the needs, perceptions and experiences of end-users'[15]. Lastly, educating nurses to improve their ICT skills is of course necessary and will go some way to improving nursing documentation in the EPR[9], but this should not compensate for inappropriately designed electronic record systems. There is an urgent

need for a paradigmatic shift in the way EPRs are designed. Ideally, designers should work collaboratively with nurses in real situations at ward/clinic level in order to understand the complexity of the role of the nurse and the need for flexible, intuitive systems.

It should be mentioned that different countries and organizations are at various stages of development in the use of EPRs. Regarding EPRs at the bedside, some hospitals in the USA have computers on wheels (COWS) which allow documentation at the bedside, improving patient safety[24]. Another solution is palmtops which are in use or under development in many places[25]. Still, it appears that a lot of work is necessary in the area of IT tools for supporting nurses' work. Moreover, this review demonstrates that there is a need for further research into how nurses experience documenting in EPRs as well as a need for more qualitative studies in order to capture the professional culture and working patterns of nurses[26]. However, the most urgent need for further research is clearly in the areas which specifically address patient safety, particularly in regard to viewing patient status at a glance on computer screens.

It seems curious that none of the articles we reviewed directly addressed the question of patient safety. Nevertheless, security and quality of documentation are closely linked to quality of care and patient safety. It has been noted that failures in the documentation system lead to failures in the care provided for patients[27, 28]. Therefore, this seems to be an area into which more research is clearly indicated.

Finally, our review highlights some positive experiences of nurses and EPRs. With regard to legibility of data there is no longer the problem of deciphering illegible handwriting, and the reduction in the amount of handwriting is another advantage. In relation to this, it is advantageous to use standardized language in order to promote more accurate reporting[14]. However, despite the limitations of our study, we argue that a preponderance of negative views dominate nurses' experience of EPRs. Furthermore, similar concerns about usability and interface have been expressed by clinicians[29, 30].

Conclusion

Predominantly, nurses were dissatisfied with EPRs because they did not support everyday clinical practice and were not user-friendly. Clearly, the nursing documentation software in the EPR requires a design which is integrated into the clinical workflow and functions optimally in clinical practice[31]. For this to happen, nurses must be involved in a collaborative approach with computer experts where a synthesis of professional skills informs design and leads to software that makes nursing documentation in the EPR as intuitive and user-friendly as buying a pair of shoes, finding a recipe or booking a holiday on the Internet. Otherwise, the frustrations of nurses may lead to an 'EPR–practice gap' similar to the long-existing 'theory–practice gap'[16], or nurses may alter their clinical practice to fit in with rigid systems, thereby losing the heart and soul of nursing as a profession[13]. To ensure that the essence and complexity of nursing are not 'lost in the system', nurses must be involved in the design of ICT solutions for supporting patient care.

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Authors' contributions

This article is adapted from an essay which was part of a BSc in Nursing. JS and PJ were responsible for data collection and analysis. JS was responsible for writing the article, supported by PJ, GN and GP.

Conflict of interest

No conflict of interest exists.

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