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Fitting clinical workflow: The case for wound care in a residential aged care home

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Abstract. Residential aged care homes have, or are in the process of implementing, electronic health record (EHR) systems to improve quality of care and reduce cost. For the system to deliver benefits, it must support nursing tasks and be seamlessly integrated into the nursing workflow. To identify whether and how an EHR system can do this most effectively, direct observation was conducted in a residential aged care home on nurses' use of EHR for wound care. The work processes of wound care and its documentation were investigated. Problems in the use of EHR were identified: 1) functional deficiencies of the EHR system which included a lack of functions to remind nurses of the existence of a wound chart, unavailability of an existent function when needed and a lack of sufficient detail in the information provided; 2) a lack of mobile devices to allow nurses to access the EHR system at the point-of-care, resulting in nurses using paper for point-of-care documentation. The findings suggest that continuous improvement in both the EHR system and its management is required to achieve integration of people, task, process and technology for the optimal benefits of EHR.

Keywords. EHR, design, integration, long-term care, nursing home, paper, software engineering, workflow, work process, wound care

Introduction

Many residential aged care homes (RACHs) have implemented electronic health record (EHR) systems in order to improve quality of care, resident safety, efficiency and reduce costs [1]. However, to date, there is little understanding of how EHR systems support nurses in the delivery of care, such as wound care, palliative care or pain management to residents. To fill this knowledge gap, this study investigated the processes of nurses' use of EHR for wound care in an RACH.

The integration of an EHR system into an existing work environment involves people, tasks, work processes and technology [2-4]. People complete a task by following relevant work processes. The role of an EHR system in this process is to facilitate task completion by providing needed functions.

For an EHR system to bring optimal benefits to nursing care, the system has to support nurses in their task completion. For example, to help a nurse complete the task of documenting vital signs (e.g. blood pressure) of a resident, an EHR system needs to provide the electronic chart of vital signs and a search function for a nurse to locate this chart in the system. In addition to providing adequate functional support [2], EHR systems need to be seamlessly integrated into the work processes to ensure quality of

care and resident safety [3], which means that it must provide appropriate support for a user whenever the support is needed.

To achieve the optimal benefits of EHR, the system needs to both meet users' needs and fit in with their work processes and the users need to adjust or redesign their work processes to accommodate the use of the system [2, 5]. For example, Baron et al. reported their experience in integrating EHR into a primary care setting in the USA [6]. To accommodate the use of the EHR system, they redesigned the workflow for the delivery of care. Although this process was extremely stressful and increased patient waiting time at the beginning, the situation improved six months later when staff became more confident with the new work processes and the use of the EHR system. The final benefit was reduced patient waiting time.

Wound care is one of the essential nursing tasks to maintain patients' skin integrity. Several wound care management systems have been developed. For example, Mobile Personalized Woundcare System™ (Mobile PWS™) [7], WoundRight [8] and WoundRounds® [9]. All three systems were used on mobile devices, but the first two did not require internet connectivity. All provided functions to document wound assessment information, track wound progress and generate a report. Uniquely, Mobile PWS™ allowed a nurse to order wound dressings and set alerts for future care actions. WoundRounds® provided wound image taking function. Both systems also provide a function to create a treatment plan.

Despite these systems developed specifically for wound care, the process of providing wound care and related documentation using an electronic system in RACHs have received very little research attention. One study was found which assessed WoundRounds® in an American RACH [9]. It used a questionnaire survey to evaluate the system's ease-of-use and effectiveness for wound management. It found that within two months, the system was easier for nurses to use. The effectiveness for wound management was also improved. In order to understand whether and how an EHR system supports nursing care in the context of Australian RACHs, our study focuses on investigating nurses' wound care processes and their use of EHR for documentation.

1. Methods

Direct observation was conducted in a non-profit, aging-in-place RACH from June to September 2013. A single observer followed nurses and recorded their wound care and how they documented it, either in an EHR system or on paper in morning shifts. Informal conversations were conducted whenever questions arose. Field notes were also taken. The research was approved by the ethics committee of the University of Wollongong. Access to the facility was given by the management of the aged care organisation. Written consent was obtained from each participant before the observation started. Four nurses worked in a morning shift, with each of them looking after about 35 residents. Nurses who participated in the study were registered nurses, endorsed enrolled nurses and personal carers with Certificate IV Level II.

A web-based EHR system was implemented in 2009. All nursing staff received a 30-minute one-on-one training three months before the implementation of the system. Staff who were newly employed after the introduction of the system was trained by their peers. A comparison of the time nursing staff spent on documentation before and after the implementation could be found in [10]. In terms of wound care, the EHR system provided wound charts which allowed nurses to document the wound

assessment information, wound dressing and frequency of care. It also provided a function to enable a nurse to search for previous wound charts. The information documented in a wound chart was useful for a nurse to provide the right care to the right wound for the right resident at the right time. The facility did not provide mobile devices (e.g. iPads) for point-of-care documentation.

To depict real work processes of how nursing staff document wound care, as-is work process diagrams were drawn using a workflow mapping technique proposed by Kmetz [11]. The diagram was validated by a registered nurse and two endorsed enrolled nurses.

2. Results

2.1. Wound Care Process

The process of providing wound care is described in Figure 1. Before providing wound care to residents, a nurse prepares paper-based documents and a wound care trolley in a nursing station. Then the nurse pushes the trolley to the room of each resident needing wound care and provides the wound care. Paper is used for point-of-care documentation. After completing wound care for all the residents, the nurse comes back to the nursing station and documents the care in the EHR system. In general, a nurse spent one and a half hour on wound care for about two to six residents in a morning shift. The number of wounds on each resident might vary from one to five.

2.2. Documentation of Wound Care

Both paper and the EHR system were used for documentation of wound care. As shown in Figure 1, three types of paper-based documents were used during the process. These were a wound care book, a wound summary sheet and a paper note. The wound care book was the main information source for wound care. It consisted of wound charts that were printed off from the EHR system. The wound summary sheet summarised who needed wound care, his or her room/bed number, the location of the wound and scheduled dates for changing the wound dressing or reviewing the wound. It was colour-coded for a nurse to distinguish the time for wound care, either in the morning shift or in the afternoon shift. Wounds to be cared for in the morning shift were listed by a nurse on the paper note before starting wound care. The paper note was used for point-of-care documentation. All the data recorded on the paper note would be transcribed into the EHR system after completing the wound care. The process of transferring data from paper to the EHR system is depicted in Figure 2.

2.3. Problems in the Use of the EHR System

Problems related to the use of the EHR system were identified and classified into two categories: functional deficiencies in the EHR system and lack of mobile devices to allow users to access the EHR system at the point-of-care. Functional deficiencies included the lack of functions to remind a nurse about the existence of a wound chart, the lack of availability of an existent function when a nurse needed it and the lack of sufficient detail in the information available for nurses.

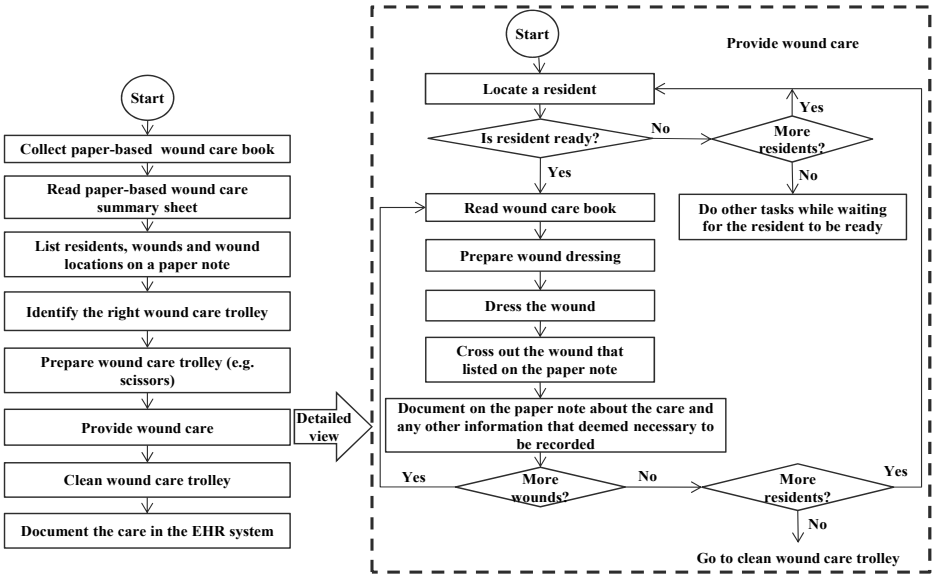

Figure 1. Wound care processes

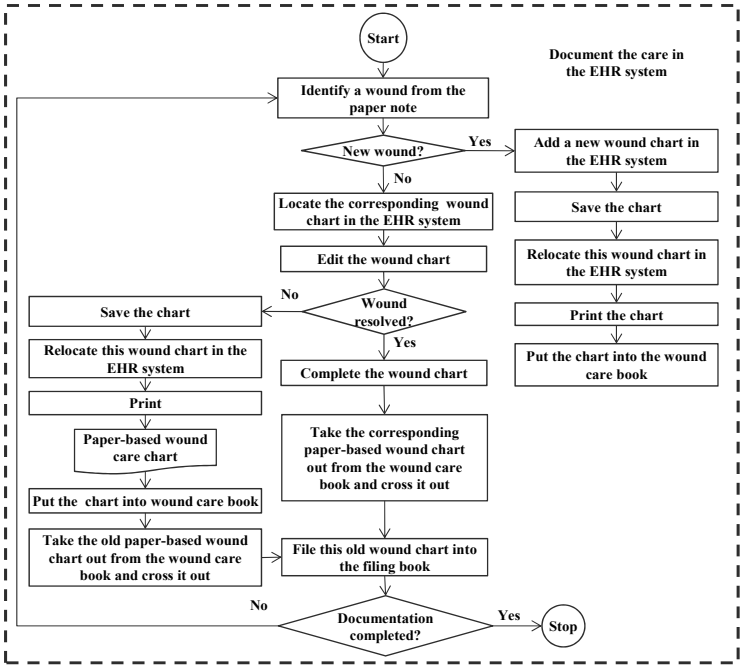

Figure 2. Transcribing data from paper to the EHR system

2.3.1. The Lack of Functions to Remind a Nurse About the Existence of a Wound Chart

The EHR system did not provide feedback about the existence of a wound chart. A nurse who had no knowledge of the existence of the chart might create a second one.

This duplication in wound charts caused further confusion for other nurses who needed to retrieve information.

2.3.2. The Lack of Availability of the Existent Function When a Nurse Needed It

Although the EHR system had a print function, this function was not readily accessible to a nurse when updating the chart. This forced the nurse to relocate the chart by clicking into the section 'View Forms & Charts', selecting the wound chart from a dropdown box and then the name of the resident from another dropdown box. A list of wound charts for this resident would then be displayed. The nurse needed to identify the right wound chart from this list. Finally, the person could open and print the chart.

2.3.3. The Lack of Sufficient Detail in Information Provided to a Nurse

In the example given above about relocating a wound chart, a nurse needed to identify the right chart from a list of wound charts. Although each wound chart in the EHR system had a brief description including resident name, chart name (i.e. wound chart), name of the nurse who created the chart and the creation date of the chart, critical information such as the location of a wound, which the nurse needed to identify the right chart was not available. This critical information was recorded inside each chart, causing the nurse to manually open each chart in order to identify the right one.

3. Discussion

This study investigated nurses' use of an EHR system for wound care to learn whether and how the system supports nurses in their task completion. Our direct observation identified three functional deficiencies in the EHR system which appeared to add unnecessary processes for nurses to complete a documentation task, instead of shortening this process and saving time. This finding suggests that system development should not stop at the roll-out stage, but must be an on-going, iterative process of redesign to support end users' work. System designers need to continue to work with users to fully understand their work processes and information needs for task completion and the characteristics of the tasks. This knowledge needs to be captured as requirements and be integrated into a redesigned system to improve the capability of the system to support task completion. Only through this continuous process of redesigning the system to fit in with the evolving task requirements, can the benefits of a successfully implemented EHR system be continuously maintained.

One of the original expectations of RACHs when introducing an EHR system was to use it to replace paper [12], however paper was still used by nurses. This was because there was a lack of mobile devices (e.g. iPad) to enable electronic point-of-care documentation. Therefore, the RACH may need to consider introducing mobile devices to allow nurses to access the system at the point-of-care. In addition, electronic wound charts provided by the current EHR system could only support documentation and information retrieval. This had little help with the management of wounds (e.g. integrated view of wound healing history). Although the current EHR system was not designed specifically for wound management, some features of aforementioned specialised wound care management systems such as Mobile PWS™ [7], WoundRight [8] and WoundRounds® [9] could be considered to be integrated into an updated version of the EHR. For example, tracking wound progress, generating a report

and ordering wound dressings [7]. A wound image capture capability offered by the system will also be useful for an accurate documentation of a wound [9]. These improvements in devices and the EHR system will be likely to lead to improvements in the process of nursing documentation (e.g. saving half of the current wound care documentation time by using a mobile device to eliminate paper-based documentation).

4. Conclusion

This study investigated the process of wound care and its documentation. Problems in the use of the EHR system in this process were identified. These included three functional deficiencies of the system: the lack of functions to remind a nurse of the existence of a wound chart, the unavailability of an existent function when needed and the lack of sufficiently detailed information. Another problem was the lack of mobile devices to allow nurses to access the system at the point-of-care, which resulted in nurses' use of paper for point-of-care documentation and the inefficient, error-prone process of double data entry. Further research may investigate medication administration process as a case to examine the impact of an electronic medication management system.

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