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## The Role of Ethnography in the Organizational Implementation of IT - 2 August 2008

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### Abstract

Ethnographic research in design often focus on the initial analysis of existing work practices in order to inform the subsequent design and implementation of new information technologies (IT). However, ethnography may also prove efficient in identifying, analyzing, and evaluating changes to work practices that emerge from using an IT system. In this article we investigate how nurses' work was affected by the introduction of a large, shared Electronic Health Record (EHR) display in two highly collaborative work situations: the nursing handover, and the interdisciplinary team conference at which all clinicians on shift are present. The use of a display led to unanticipated and interesting new ways of collaborating among the nurses and between nurses and physicians. Evaluations of the initial use of new IT can establish a potentially important role for ethnography within iterative approaches to design as well as within the organizational implementation of IT.

### Introduction

Changes to work practices resulting from the introduction of new technologies such as EHR, can be categorized as either anticipated, emergent, or opportunity-based [1]. Anticipated change is planned ahead and occurs as intended by the originators of the change. Emergent change is defined as local and spontaneous changes, not originally anticipated or intended. They happen as a result of users taking advantage of the new opportunities afforded by the technology. Opportunity-based changes are purposefully introduced changes resulting from unexpected opportunities, events, or breakdowns.

Traditional planning approaches and quantitative evaluation methods support the implementation of anticipated changes. Qualitative methods in terms of ethnographically inspired observations might be efficient in identifying emergent change. The role of ethnography is acknowledged within initial design and within participatory design approaches - which are driven by the users and by learning experiments based on iterative design and evaluation of prototypes [2, 3]. Ethnography can identify and analyze changes to work practices that emerge from using an IT system. Such an approach might empower users by identifying and turning selected emergent changes into planned interventions and opportunity-based change [4].

### The Case

An advanced prototype of an EHR system was configured in collaboration with clinicians at a neurological stroke unit at a hospital in Denmark. The system was implemented and evaluated in a trial period lasting one week. During this trial

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period all clinicians used the EHR system 24 hours a day, and it replaced all paper records. The EHR system simulated a fully integrated clinical process, years before such systems are expected to be in operational use in Denmark [4].

We investigated emergent changes to nurses' work when having collaborative access to electronic patient records via a display (a PC screen projecting onto the wall using a standard projector mounted in the ceiling). Our data were collected by means of participant observation supplemented by follow-up interviews, video-recordings, and full-motion screen interaction recordings of clinical work during two highly collaborative situations:

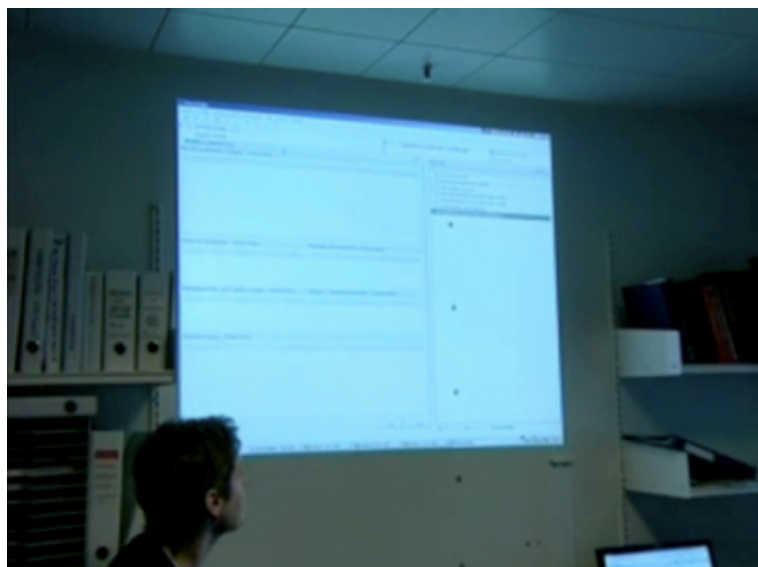


Figure 1: Access to electronic patient records via a display

- Nursing handover, which happens three times a day at the beginning of each nursing shift (7am, 3pm, and 11pm) and lasts about an hour. In this stroke unit there is no time for the nurses that leave the ward to discuss patients with the nurses on the next shift. During nursing handovers, one nurse is designated as the team leader and provides an overview of the patients at the ward and manages the necessary coordination and exchange of information. This nurse reviews the patient records immediately prior to the handover and then, during the handover, verbally informs the others about patient status and plans for the shift.



Figure 2: The paper-based nursing handover prior to the trial period

- Team conference, which takes place once every weekday, lasts approximately 15 minutes, and includes all nurses and physicians. The team conference takes place within an hour after the nursing handover at the beginning of the day shift. An interdisciplinary assessment of each patient is carried out and plans are revised. The current status of each patient is given verbally by a nurse (the team leader from the preceding nursing handover) and an overview of current plans is available by means of a table on a large whiteboard or, during the trial period, a shared EHR display projected on the wall.



Video-clip 1: The team conference [5]

Our observations of the traditional paper-based nursing handovers and team conferences (prior to the trial period) showed a common characteristic with regard to the nurse acting as team leader: The team leader informs the other participants about the patient by reading information from own notes supplemented by the paper-based patient record, which is available to the team leader only. This verbal handover of information from the team leader to the other participating clinicians represents a long-standing and common practice within nursing handovers [6]. The verbal shift report maintains the team leader’s role as chair during the handover and constitutes what we can characterize as a gatekeeper [7], controlling access to the information in the patient record. In the trial period the EHR was displayed on the wall during nursing handovers and team conferences. Such an EHR display reduces the gatekeeper’s role to navigating the EHR; its content is available to all participants (see Figure 3).

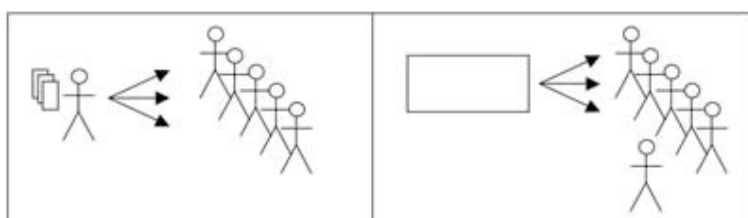


Figure 3: Team leader acting as gatekeeper controlling access to the information in the paper record (left) and shared EHR display with patient information visible to all participants (right).



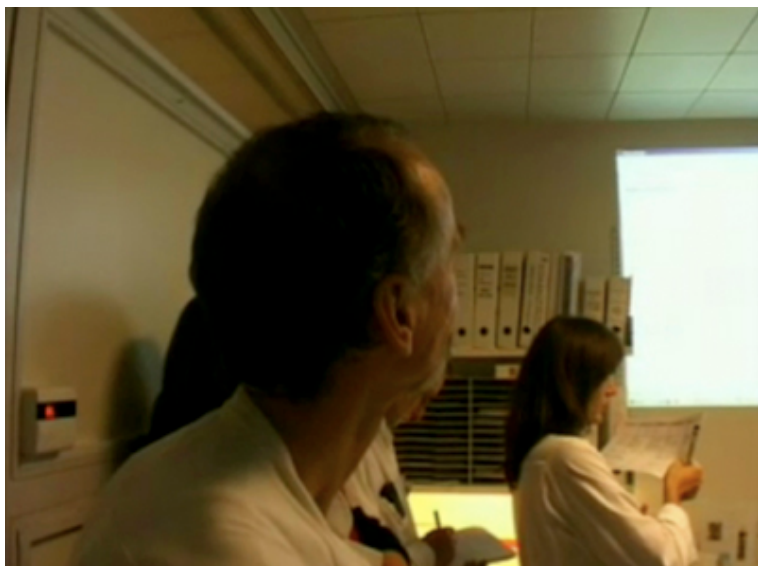


Figure 4: Clinicians at the team conference reading the display

The use of a shared EHR display led to interesting observations of new ways of collaboration among the clinicians during nursing handovers and team conferences. We observed an immediate emergent change as the traditional verbal way of informing about patient status changed to collectively reading the information on the shared display. This in turn was followed by other emergent changes of which we will further elaborate two:



Video-clip 2: Collective reading of the EHR [5]

#### *Collective investigation of the patient record at the nursing handover*

As a result of the ability to collectively read the patient record on the shared display, we observed that the nurses initiated collective investigations of the patient record. During the use of paper records we observed that patient records were seldom seen by clinicians other than the team leader, except in cases for example where the handwriting was unreadable. During the trial period patient records (on the shared display) were repeatedly inspected by all nurses present at the handovers, and they collectively participated in interpreting the status and condition of patients.



Video-clip 3: Collective investigation of the EHR [5]

#### *Sharing nursing observations during the team conference*

The nurses experienced how the shared display designed for the team conferences formed the agenda for these conferences. During the trial period the nurses initiated a change of this screen - influencing the agenda of the team conferences. The change consisted in adding a panel specifying selected nursing observations of relevance to the team conference. This way, the nurses' observations became more salient to the clinicians as they were forming their overview of the status of the patients. The nurses themselves were in charge of which of their observations were to be communicated to the other physicians present at the team conferences.

#### **Discussion**

Our analysis investigated how nursing work was affected by making EHR information available on a large, shared display during two highly cooperative situations: Nursing handovers and team conferences. We observed an overall change from verbal presentation to collective reading of patient records. This in turn led to collective investigations of patient records - something that was not observed during the use of paper records. Finally, the impact on the team conference of using the shared display motivated the nurses to have this display modified in order for them to share their most important observations with the physicians.

The collaboratively available patient records supported the nurses in getting a more instant and efficient overview, which enabled them to engage in collective investigation and, thereby, strengthened their possibilities for gaining thorough insight into patients' conditions.

The collective investigations fostered a mutual learning process where the nurses shared their observations and interpretations and in that way stimulated clarification of open issues and a pursuit of hypotheses about the patient's status and condition. The nurse team leader's role of information gatekeeper faded in favor of a handover characterized by peer-review, second opinions, and the establishment of a professional confidence based on collaboratively developing an understanding of the patients.

The nurses' confidence in their observations was demonstrated at the team conferences. The nurses quickly recognized a possibility for impacting the conference agenda by means of nursing observations visible on the shared display, and they managed to change the design of this display to include their observations. This increased the visibility and prominence of the nurses' work at the team conferences and thereby supported a cross-disciplinary element of clinical work.

#### **Conclusion**

The analysis presented in this article is based on detailed ethnographic observations of the collaboration between nurses and physicians during nursing handovers and team conferences. This evaluation identified how new ways of handling their work emerged for the nurses' as they experienced and incorporated the shared EHR display in their collaborative work practice. We find that nurses:

- Abandoned verbal presentation of patient records in favor of collective reading. This constitutes a substantial departure from a long-standing nursing practice, triggered by the availability of the shared EHR display and quickly encountered and adopted by the nurses.
- Engaged in collective investigation of patient records at nursing handovers. The shared EHR displays seemed more efficient at providing an overview of patients than verbal presentation. This resulted in more nurses taking active part in interpreting the status and condition of patients stimulating a mutual learning situation.
- Made nursing observations a prominent, shared resource during team conferences. By having a panel with selected nursing observations added to the EHR display these observations became part of the shared agenda with no further need for nurses to promote their observations.

The prospect of using ethnography as a means for evaluating emergent changes yields methodological implications for how to develop and evaluate IT systems such as EHR systems. Used consistently, through several iterative cycles, such ethnographically based evaluations might identify and select emergent changes and turn them into new planned ahead anticipated changes in the following implementation of the system. This way ethnography can extend its traditional role from informing design through initial analysis of existing work practices to an active part of the subsequent organizational implementation process focusing on getting new IT to work properly for the users.

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