MEDINFO 2007
HISA Ltd Australia
© 2007 The authors. All rights reserved.

A Study of Clinicians' Information Systems Usage in Patient-Centered Situations – Preliminary Results

Inger Dybdahl Sørby, Øystein Nytrø

Dept. of Computer and Information Science, NTNU (Norwegian University of Science and Technology), Trondheim, Norway

Abstract

This paper presents preliminary results from an observational study performed at a Norwegian university hospital. The purpose of the study was to identify and capture clinicians' information and communication behaviour and also to further develop a method for performing structured observation of clinicians' patient-centered work. One fifth-year medical student spent 20 days in two different hospital wards, following 7 physicians from one to seven days each. The observer recorded data from several ward situations such as pre-rounds meetings, ward rounds, and discharge situations. The data was recorded by means of an observation form consisting of a mixture of codes and free-text fields.

Keywords:

observational study, structured observations,
mobile health information systems,
requirements engineering

Introduction

This paper presents an extensive observational study performed during a three-month period in two hospital wards. The aim of the study was to identify and capture information and communication behaviour among healthcare workers in hospital wards, based on the further development of a framework for performing focused and structured observations. The framework has been developed iteratively during several previous observational studies[1]. The underlying purpose for the study and for the framework development has been to be able to elicit and produce comprehensive requirements for the user interface of mobile clinical information systems.

Methods

The study was carried out at a large Norwegian university hospital during the period July – September 2005. The observations were conducted by one fifth-year medical student. The student performed non-participatory observations of physicians in two hospital wards (Division of Gastroenterology and Department of Cardiology). During the study, the medical student followed one physician at a time, observing the physicians' daily patient-centered work. The participants included one chief physician with many years of experience in the ward, medium experienced senior residents, assistant residents, and one young intern. Both male and female physicians were among the participants.

The data was recorded by means of an observation form and processed in Microsoft Excel. The observer recorded data regarding the physicians' use of various information sources for retrieving and storing patient-related information in several common ward situations (e.g. pre-round meetings, ward rounds, and discharge). One *situation* is here defined as a time-limited process or sequence of actions/tasks (for an individual patient) in which the cast (actors filling roles) does not change, and which has an identifiable start, preconditions, end, and result. The recorded information consisted of sequences of acts with associated activity, trigger, location, main actor and role, co-actor(s) and role(s), patient ID, situation start and end time, information source, information type, purpose, and result. No sensitive or personal identifying data was recorded. Most of the recorded information was coded on-site by means of pre-defined values, while for instance 'Purpose' and 'Result' consisted of short free-text notes.

After four days of observation at Division of Gastroenterology, the recorded data was evaluated. This resulted in an expansion of the observation form of four new free-text columns; 'Illness history', 'Reason for admission', 'Previous knowledge', and 'Patient category'. The purpose of the extension was to enable more qualitative analysis of the data.

Results

During the study, 11 days of observation were conducted at Division of Gastroenterology and 9 days at Department of Cardiology. One chief physician, 5 residents, and 1 intern were followed. The co-actors of the situations consisted of other physicians, nurses, patients, and relatives. The recorded activities concerned approximately 70 different patients. One hundred and thirty-five situations consisting of a total of 525 acts were recorded at Div. of Gastroenterology, while 190 situations/1032 acts were recorded at Dept. of Cardiology. The numbers of each observed situation type are summarized in Table 1.

More than 200 of the 325 observed situations were recorded during pre-rounds meetings and ward rounds, which are the most predefined and regular, daily activities concerning all patients in the two wards. In the preliminary analysis of the data we have focused on the communication and information behaviour during these situations for *Resident1* (R1), *Resident9* (R9), and *ChiefPhysician9* (CP9). We have manually categorized the observed events into 12 different predefined communicative acts (i.e. navigate into common understanding, assess, answer inquiry, inform, evaluate, request information, prescribe, order, refer, delegate responsibility, remind, sign) and created communicative acts profiles for the physicians [2]. The profiles have been plotted as radar graphs, in order to visualize how the different information sources (categorized as paper-based, electronic, or human) have been used when performing the various communicative acts during the pre-rounds meetings and the ward rounds. Among the interesting results of our analysis were: Experienced clinicians cooperate without explicit communication, in contrast to interns who are much more explicit. Younger clinicians tend to use information systems more systematically and broadly. See elsewhere [2] for a more detailed analysis.

Discussion

Table 1 – Summary of observed situations. The table shows the number of observed situation types per main actor; Residents 'R1' and 'R2' and intern 'I1' from Div. of Gastroenterology (Gastro) and residents 'R7', 'R9', and 'R14', and chief physician 'CP9' from Dept. of Cardiology

Situation type	***Gastro***			***Cardiology***				***Sum***
	R1	***R2***	***I1***	***R7***	***R9***	***R14***	***CP9***	
Morning meeting	5	-	6	-	-	-	-	11
Pre-pre-rounds	-	-	-	5	-	-	-	5
Pre-rounds meeting	37	6	20	7	22	11	24	127
Ward-rounds	15	7	-	7	21	11	24	85
Examinations	-	-	-	-	8	2	6	16
Office work	16	7	-	-	8	9	13	53
Discharge prep.	1	4	-	-	-	2	4	11
Disch. Meeting	-	-	-	-	-	-	4	4
Heart meeting	-	-	-	-	1	-	1	2
Other meetings	5	1	5	-	-	-	-	11
Total	79	25	31	19	60	35	76	325

The communicative acts profiles created so far have been for individual physicians, but it is also interesting to create role profiles (i.e. interns, senior residents etc.) in order to study differences between communicative behaviour of various groups of healthcare workers. Another approach is to profile specific activities (e.g. drug related events), as a means for eliciting and analyzing requirements for new information systems.

The recorded data are based on the observations and subjective interpretation by one medical student. In future studies, the method should be improved by using two or more observers in order to ensure consistency.

The study was mainly performed during summer time, and thus the ward staff was reduced and the remaining physicians had more responsibilities than they normally do (e.g. chief physicians performing ward rounds). However, the intention of the study was not to capture 'normality', but rather to verify a method for observation and recording of clinicians' information and communication behaviour, regardless of working conditions.

The physicians in the hospital wards work on a rotation scheme, and the observer followed various physicians on call, from one (*R2* and *R7*) to seven days (*R1*) each. So far, mainly the data of the 3 most observed physicians have been analyzed, but the remaining data can be used in qualitative analysis and to illustrate variations in the observed situations. Only physicians were followed in this study, but future studies should also include other actors/roles (e.g. nurses).

Conclusion

The observational study presented in this paper was mainly performed in order to validate and improve a method for conducting structured observation of clinicians. The results of the study confirm our previous findings:

- Structured observation by means of pre-defined forms enables efficient recording of clinicians' information and communication practice in hospital wards
- Using apprentices (medical students) as observers is beneficial due to their domain knowledge and natural, non-intrusive presence in the hospital wards
- The data recorded via observation differs from e.g. survey data, and the detailed context information of the various situations is valuable when eliciting and analyzing requirements for new mobile clinical information systems

References

[1] Sørby ID, Nytrø Ø. Towards a Tomographic Framework for Structured Observation of Communicative Behaviour in Hospital Wards. In: Sawyer P, Paech B, Heymans P, editors. Proceedings of REFSQ 2007 (LNCS 4542). Berlin: Springer-Verlag; 2007. p. 262-276.

[2] Sørby ID, Nytrø Ø. Analysis of Communicative Behaviour: Profiling Roles and Activities. In: Third International Conference on Information Technology in Health Care (ITHC2007): Socio-technical approaches; Sydney, Australia; 2007.

Address for correspondence

Inger Dybdahl Sørby, Dept. of Computer and Information Science, NTNU, NO-7491 Trondheim. E-mail: inger.sorby@idi.ntnu.no