

Scandinavian Journal of Information Systems

Volume 15 | Issue 1

Article 5

2003

Coordinating work in hospitals through a global tool: Implications for the implementation of electronic patient records in hospitals

Gunnar Ellingsen

University Hospital of Northern Norway, gunnarelingsen@emailaddressnotknown

Follow this and additional works at: <http://aisel.aisnet.org/sjis>

Recommended Citation

Ellingsen, Gunnar (2003) "Coordinating work in hospitals through a global tool: Implications for the implementation of electronic patient records in hospitals," *Scandinavian Journal of Information Systems*: Vol. 15 : Iss. 1 , Article 5.

Available at: <http://aisel.aisnet.org/sjis/vol15/iss1/5>

This material is brought to you by the Journals at AIS Electronic Library (AISeL). It has been accepted for inclusion in Scandinavian Journal of Information Systems by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Coordinating work in hospitals through a global tool

Implications for the implementation of electronic patient records in hospitals

Gunnar Ellingsen

University Hospital of Northern Norway

Abstract

Modern organisations increasingly have to face the challenge of increased complexity and specialisation. The specialisation of work requires professionals, people possessing specialised skills and often having a high level of education. Organisations that face this kind of problem are large hospitals. The implementation of Electronic Patient Records (EPRs) in these hospitals is accordingly expected to reduce complexity and curb specialisation by coordinating work among contexts and different types of users. The paper is based on a hospital department with several different professionals working together. The professionals successfully organise their work and the production of their reports according to a global classification system. This makes the case an illustrative example on how hospitals might take a starting point in EPRs through such a mechanism and may provide some strategies for the implementation of EPRs.

Keywords

division of labour, coordination, ICF, electronic patient records, large hospitals, collaboration, professions

Introduction

Giddens (1990 p. 76) argues that "Modern industry is intrinsically based on divisions of labour (...) There has undoubtedly taken place a major expansion of global interdependence in the division of labour since the Second World War". Undoubtedly, organisations face the challenge of increased complexity and specialisation (Zack 1999) as a result of increased commercial competition, regulations, social demands and new technologies.

The increased specialisation of work requires professionals, people possessing specialised skills and often having a high level of education. In complex organisations, this is reflected in hierarchical structures along disciplinary boundaries, making it difficult to see work-processes as a whole. Complexity increases as approaches towards apparently similar problems fluctuate with context and profession. Accordingly, the need for coordination of activities is present and has resulted in reiterated efforts in identifying tools that can interconnect specialised work. Developments in computer technologies have been promising in this regard, especially in the field of Computer Supported Cooperative Work (CSCW). The focus in CSCW has centred on the employment of tools, artefacts, protocols and mechanisms that can coordinate distributed work (Schmidt and Simone 1996; Rogers 1993).

Large hospitals face the kind of problem outlined above. In these contexts, clinical work is characterised by state-of-the-art knowledge, high levels of education, but is also recognised by a very complex division of labour (Blume 1991, p. 17; Atkinson 1995, p. 7; Schneider and Wagner 1993, p. 230). This also tends to escalate as a result of developments in medical technologies, which subsequently lead to new disciplines (Blume 1991, p. 18). A higher degree of mobile patient groups and employment of telemedicine also contributes to a higher degree of global interdependency of activities among hospitals, regions and countries. The explicit division of labour complicates patient treatment and care, hampers collaboration among different specialities and results in different work strategies for diagnosing, caring and curing

patients.

The implementation of Electronic Patient Records (EPRs) is expected to curb this process by integrating information and coordinating information-based processes across departments, among different types of users and over time (Hartwood et al. 2001; Grimson, Grimson and Hasselbring 2000, Ellingsen and Monteiro 2003). However, the results so far indicate that the EPRs fail to fill such a role, as the implemented EPRs only seem to support the existing division of labour in hospitals (Lærum, Ellingsen and Faxvaag 2001). What seems to be missing is a coordination mechanism that can play a global role in order to make information about a patient valid across time and space. Therefore, some sort of common objects must be established among the different professionals. A key point is that such a coordination mechanism cannot simply grow from the bottom just like that. It must have a flavour of sharedness and globalness.

The study reported in this paper focuses on clinical work in the Department of Rehabilitation at the University hospital of Northern Norway, where seven different professions are organised together. This includes nurses, occupational therapists, physicians, physiotherapists, one speech therapist, one psychologist and one social worker. Of particular interest for this study is the department's use of the "global" WHO-based classification system International Classification of Functioning, Disability and Health (ICF) as a means to coordinate work among the different professionals in the department. The department managed to obtain coordination and was successful in making changes in work policy and practice mainly by the means of using the ICF. The ICF thus did work as a successful local coordination mechanism – and with the important potential as being able to work also as a global coordination mechanism. This makes the case an illustrative example of how hospitals might take a starting point in EPRs through global classification systems such as the ICF, and may provide some strategies for implementing EPRs in hospitals.

The analyses have been pursued along three dimensions.

First, I elaborate on the role of the ICF and focus on what it takes to establish and maintain it as a mechanism that coordinates work among different professionals performing highly specialised work. I also examine what role the ICF plays in achieving a common ground and elaborate on how the ICF can support both distributed coordination (Rogers 1993, p. 295; Schmidt and Simone 1996, p. 159) as well as the coordination of work in real time (Berg 1999, p. 389).

Second, given that the ICF coordinates work of a lot of different professionals, this makes it impossible to design it to meet every situated work settings associated with each profession. Different professionals represent unique cultures and local peculiarities per se. Consequently, the implementation of a global coordination mechanism will have implications for the organisation of work itself. I illuminate how organising work along a global coordination mechanism might shape the work-practice and the mutual relationship among the professionals.

Third, I explore how global coordination mechanisms need to achieve local grounding and meaning. The implementation of global collaborative systems requires that individuals working together need to coordinate their work even more (Rogers 1993, p. 295). Accordingly, failing to acknowledge the local aspect of global solutions often results in a lack of adoption, resistance in use or only temporary validity (Bowker and Star 1999, p. 293).

The remainder of this paper is organised as follows: The next section elaborates more thoroughly on the theoretical foundation; the third section reflects on the research design; the fourth section illustrates the hospital context and the department. The fifth section presents three case vignettes, which illustrate clinical work in different stages of a patient stay. Each section is followed by a sequence of analysis especially elaborating on the role of the ICF. The sixth section contains the rest of the analysis. The conclusion is presented in section seven and contains some implications for the implementation of large-scale EPRs in hospitals.

Theory

Hospitals are large, complex and dynamic organisational entities. The complexity has

several sources. There are a large number of distinct health professions with associated communities of practice and with different political standing in the hierarchy. The collection of tools, artefacts and equipment is significant. This spans from a variety of utterly mundane artefacts such as report templates and archives to high-tech equipment like MR scanners requiring competent and specialised users. The trajectory of a patient during a stay spawns a comprehensive set of work tasks. This underscores how complex work in hospitals is, and needs to be coordinated between the different professionals, tools and artefacts as argued by Schmidt and Simone (1996, p. 159):

“Actors tacitly monitor each other, they perform their activities in ways that support co-workers’ awareness and understanding of their work; they take each others’ past, present and prospective activities into account in planning and conducting their own work.”

Coordination of distributed work in hospitals amounts to formal paper-based records, order forms and schemas as well as informal coordination, orally or informal writings. An EPR will feed directly into this process and will – as its paper-based counterpart – play a productive role in the actual organisation of the work as it coordinates, delegates and distributes work across time and space and professional groups (communities) (Berg 1996; Berg 1999; Hutchins 1994; Smith 1990).

The discourse around the integration of information and coordination of activities in connection with EPRs mirrors exactly the more general and long-standing debate in management information systems and Enterprise Resource Planning systems (Hartwood et al., 2001; Hanseth and Lundberg 2001). Perfectly aligned with the arguments for Enterprise Resource Planning systems, the EU-funded project Synapses points out that:

“[U]sers performing diverse tasks (...) [in] different department within a hospital may have deployed different (...) systems that should be integrated in order to support the business processes adequately” (Grimson, Grimson and Hasselbring 2000, p. 52-53).

Unfortunately, the EPRs in Norwegian hospitals are strictly organised in accordance with the

existing disciplines as illustrated in Figure 1.

| |
|--------------------------------|
| Physicians' discharge letters |
| Physicians running notes |
| Nurse reports |
| Occupational therapist reports |
| Physiotherapy reports |
| Speech therapist reports |
| Psychologist reports |
| Social worker reports |

Figure 1: The traditional way of organising information in Norwegian hospital-based patient records.

This structure mirrors the way the paper-based records are organised. In that sense, both adhere to the recommendation from the Norwegian Board of Health (NBH, 1994). However, such a strategy only enables support within disciplines and not across them. Accordingly, the existing division of labour is enforced, as information technology (IT) tends to make disciplinary work even more explicit (Rolland and Monteiro 2002). This is unfortunate as EPRs as specialised IT artefacts are assumed to be instrumental in reducing the complexity of articulation work and in alleviating the need for ad hoc deliberation and negotiation (Schmidt and Simone 1996, p. 162). The strong division of labour in hospitals thus reduces the possibilities of obtaining collaboration that goes beyond purely delegating work tasks between different professionals, or emphasised even more strongly: 'given the multiplicity of perspectives, it is far from evident that people be capable of producing collective goods' (Schneider and Wagner 1993, p. 230). Accordingly, this hampers a context where coordination mechanisms in an EPR need to have a global focus.

There does not exist much work that deals with coordination in hospitals. Some notable exemptions are Hartswood et al. (2003), Egger and Wagner (1993), Symon, Long and Ellis (1996), Berg (1999), Schneider and Wagner (1993) and Svenningsen (2003). However, none of them examine in detail how a global tool may coordinate work of very different professionals. Therefore, exactly how coordination

mechanisms in a large-scale EPR will look is an open question (Berg, 1999 p. 375), both as a result of failed efforts to introduce EPRs in hospitals, but also as a result of the lack of related research in the CSCW-field. In addition, much of the empirical research that addresses the issue of work-coordination has focused on the activities of small work groups (Symon and Ellis 1996, p. 3). This is of less relevance when dealing with EPRs that will encompass different departments, hospitals and even countries.

Nevertheless what can be predicted is that coordination through an EPR will take different forms as:

"Activities can be coordinated over different times in a single location, or they can coordinate activities across different times and different places. They can also coordinate activities in real time in a single location" (Berg 1999, p. 388)

An example of this in everyday clinical practice is that the mode in which clinical work takes place is geared towards 'what to do next':

"Through [the physician's] activities of reading and writing (...) he narrows down the plethora of potential tasks and divergent data into a clear notion of 'what to do next'" (Berg 1996, p. 5)

One aspect of the 'what to do next' for hospital workers, is the way the content of the EPR – forms, reports, schemas, laboratory reports and discharge letters – simultaneously function as cues or tokens that feed into the coordination, delegation and accountability of the work, also of nurses, secretaries, physiotherapists and other professions (communities) at a hospital (Berg 1996; Berg 1999; Smith 1990). Hence, the EPR plays a performative role in the everyday organisation of hospital work in total, an organisational complexity that exceeds any individual's capacity (Hutchins 1994).

Another aspect of implementing an EPR is how organisational behaviour is inscribed into the EPR artefact. Consequently, both foreseen and unforeseen changes might emerge. This is an often-underestimated aspect in CSCW literature. Much of the CSCW literature focuses on how humans in group-settings make things work when dealing with collaboration tools and focuses to a lesser degree on the tool's role in transforming itself and the context it is part of,

that is, the transformative potential as underscored by Berg (1999, p. 385):

“The mutual activities of tools and staff members are made possible through their interrelation, and, at the very same time, this interrelation affords the emergence of an overall activity that surpasses the individual contributions that both could be discerned to have”

The transformation of work practice or change in the tool itself as a result of implementing EPRs, draws attention to the heterogeneity aspect of bringing together people with different disciplinary educations and the complexity of how – and contingency of – the ways in which these elements interrelate (Law 1987, p. 111). Making EPRs work in a myriad of heterogeneous contexts is difficult as people from different backgrounds measure quality in different ways; they see different problems and their contributions are evaluated in accordance with their professions’ norms and values. This implies that continuous negotiating is a part of the collaboration and work processes:

Major changes in commitments mean transforming work organisations and “retooling” workplaces and practitioners. These transformations require significant time, effort, and financial resources (Fujimura 1996, p. 10).

Adhering to such an approach is obviously different than strictly working in terms of “your own” discipline. It might break the traditional division of labour, redistribute power and control and consequently transform work. This is however not uncomplicated as professionals have the special privilege of freedom from the control of outsiders. One of the claims that justify such a privilege is that “there is such an unusual degree of skill and knowledge involved in professional work that non-professionals are not equipped to evaluate or regulate it” (Freidson 1970, p. 137).

The empirical focus in this study draws on the global classification mechanism ICF. Global classification systems share some resemblances with large-scale EPRs. First, the classification system International Classification of Diseases (ICD) is for instance an important part of hospital-based EPRs for the purpose of coding diseases and procedures. Second, the same ICD

constitutes an impressive attempt to co-ordinate information and resources about morality and morbidity globally (Bowker and Star 1999, p. 21). Accordingly, global classification systems – as large scale EPRs – are recognised as an important infrastructural component of medical software, as they attempt to collect global information across several unique contexts.

Method

This study belongs to an interpretative approach to the development and use of information systems (Klein and Myers 1999, Walsham 1993) relying on four types of data: participative observations; interviews; informal discussions; and documents. The observations took place from January-March, 2002 at the Department of Rehabilitation at the University Hospital of Northern Norway. In total, 40 hours were spent observing work. Six of those hours were based on video observations of meetings and teamwork. Patients also participated in these meetings. In general, people did not seem bothered by being observed.

Predominantly, the study can be denoted as ‘realistic’ as it focuses on ‘thoroughly mundane details of everyday life among the people studied’ such as ‘the regular and often-observed activities of the group under study’ (Van Maanen 1988, p. 48). It is in part also inspired by the ‘impressionist’ style as we try to give the story’s supporting players lines to speak (ibid. p. 105).

In addition, I conducted 10 semi-structured interviews during the period mentioned above. Each interview lasted from one to two hours. As background material I have also conducted observations at several other departments at the hospitals. These observations constitute 60 hours of observation.

Setting the stage

The Department of Rehabilitation was established in 1995 and aims at the rehabilitation of complex patients in the following categories: stroke, long-run damages as a result of polio, chronic pains, complicated amputations, multi-traumatic damage, brain damage as the result of accidents and some other diseases. The patients stay for a relatively long time. The department presupposes a

broader approach to problems and strategy compared to more traditional departments. They like to say, “we focus on the whole human”. This means that body functions, daily activities and environmental factors are important factors in patient evaluations and treatment strategies.

The health care workers are organised directly in the department including seven different professions: nurses, occupational therapists, physicians, physiotherapists, one speech therapist, one psychologist and one social worker. All in all they are about 40 employees. Most of the employees are women, including the three physicians. The relative number of physicians is small, however, compared to other departments.

| ICF | Detailed classification of each dimension |
|-------------------------------------|--|
| Environmental factors | Family, social network, residence, neighbourhood, remedies, workplace, economy, transport |
| Participation | Self-care and family, residence and home Work/education Spare time, friends, neighbourhood and society |
| Body Functions and structure | Medical conditions, various results of examinations Sensation functions (sight, hearing, taste, smell, touch, proprioceptors, temperature, pain) Voice, speech, swallow-function Language and communication Cognitive functions; orientations, concentration/attention, practice, memory, learning, space comprehension, problem solution, ability of appreciation, others General motor, joint and muscle function, balance, stability, breath and ability of relaxation |
| Activity | Movement and mobility inside and outdoors Hygiene, clothe, toilet visits, eating, housework and other daily activities |

Figure 2: The ICF template used to coordinate interdisciplinary meetings

The way work is coordinated and documentation is produced in this department is different from what is practised in more traditional departments. The accomplishment of

meetings is coordinated through a framework called ICF (International Classification of Functioning, Disability and Health), which is a classification system developed by the World Health Organisation (WHO). This means that the ICF is actively used as a real-time coordinating mechanism. The ICF paper form that is employed in the meetings is presented in figure 2.

When the patient leaves the hospital, an interdisciplinary report is produced that is sent to the municipal health service. Everybody in the team (except for the physician that instead produces a discharge letter) participates in the production of this report, which is coordinated electronically along ICF-dimensions. See Figure 3 below:

| ICF | Body function and structure | Activity | Participation | Environmental factors |
|-----------------|-----------------------------|----------|---------------|-----------------------|
| Resources | | | | |
| Problems | | | | |
| Patient goals | | | | |
| Measures | | | | |
| Procedure | | | | |
| Evaluation | | | | |
| Goal evaluation | | | | |

Figure 3: The ICF-dimensions in interdisciplinary reports

The cases

Three different vignettes at the Department of Rehabilitation are presented. Each of them aims at illuminating the use of the ICF as a global coordination mechanism. Characteristic features of the work situations are as follows:

The first vignette presents the role of the ICF in interdisciplinary meetings. The ICF is employed to coordinate the course of the meeting with several participating professions. A key point is to illuminate how the ICF contributes in establishing a common ground and how the ICF can relieve coordination of complex work.

The second vignette illustrates how the participants themselves question the role of the

ICF and illustrates how the use of such a mechanism requires continuous maintenance work.

The third vignette illustrates the electronic version of the ICF. The ICF is used for coordinating work across time and space when different professionals collaborate in writing the interdisciplinary report.

Coordination of interdisciplinary meetings

The “brain injury” team is gathered to discuss a patient that has been involved in a car accident that has induced serious injuries in the patient’s brain and subsequent serious bodily malfunctions. Consequently, the patient is bound to stay at the department for several months as a part of his rehabilitation process. The different professionals have collected surveyor data on the patient and use this meeting as a basis for discussing treatment and rehabilitation objectives for the patient.

Five persons are present: a physiotherapist, a physician, a nurse, a speech therapist and a relative of the patient. Only the speech therapist is male, the rest is women. The patient’s condition makes it impossible for him to participate, which accounts for the presence of the relative. On the table there are several documents: a rehabilitation plan, paper-based patient records and personal notebooks for each of the professionals. The atmosphere in the room is marked by intense concentration and the participants appear much focused on the case. On the table in front of the physician there is an ICF-paper-sheet (figure 2), which plays a core role during the meeting. After some introductory comments, the physician looks down at the ICF-template on the table:

PHYSICIAN: Okay, lets start ...this is a big case, but I am counting on everybody to be prepared for the surveying in such a way that all can contribute (...) then we start with ... (she is concentrated and bends over the ICF-template that she has placed in front of her, turns it on the flip side and reads quickly before she turns it back) ...the survey of “Environmental factors”, family, friends, contact persons. We collapse work and spare time.

NURSE: Yes, Magnus is a schoolboy. He had an evening job in a grocery store in the centre of

his hometown. He lives with his mother and father ... (she continues to elaborate on the environmental factors)

PHYSICIAN: (missing something, reads from the ICF-template again) did you say anything about him being much out with friends and that he was active?

NURSE: Oh yes ...I have not said anything about spare time interests ...I forgot that. He trained a lot. He trained regularly at a health studio at least once a week; he was interested in computers, The Internet (...)

PHYSICIAN: Okay, (pointing with her pen on the ICF-template in order to orient herself), let's move on to “Body Functions and structure” and discuss the medical conditions (she continues to talk). He had surgery for an acute subdural haematoma and then it is the diffuse axonal damage that is pretty widespread in his brain that is the main cause of his current situation.

(...)

PHYSICIAN: Yes, then we move on to general condition, sleep, emotional conditions, reactions as a result of damage, (reading from the ICF-template).

NURSE: It appears that Magnus sleeps pretty well. When we wake him in the morning it is pretty okay (...) on Sunday we permitted him to stay a bit longer in bed since it is what the young people like to do at the weekends (she smiles ...and continues to talk).

PHYSICIAN: (asking). And the emotional condition was perhaps not that easy to say anything about (she supports herself on the ICF-template), but does it appear that he manages to relax, so to speak?

SPEECH THERAPIST: My observations are that he feels more confident with us who are in daily contact with him. His behaviour has changed. In the beginning he was more sceptical.

NURSE: To a certain degree I agree with you, but at the same time it is a bit difficult to be sure. Last night he was extremely uneasy and they did not manage to calm him. As for the mornings it is pretty difficult to start the morning care if you can't calm him. At least, the morning care takes two hours.

SPEECH THERAPIST: (nodding), yes, and

yesterday he was very down during the day (the nurse is nodding) (they all participate in this discussion).

The way the physician in the 'brain injury' team uses the ICF is in close conformance with both the structure and the order of the ICF-framework. In this way, the ICF plays a central role when the actual work is performed; it coordinates activities in real time in a single location (Berg 1999, p. 388).

Even if the 'brain injury' team deals with a case where the medical aspect is very complex and central, they start out with – in conformance with ICF – the environmental factors and not the medical things. The close adherence to the ICF allows an increase in complexity of the work-practice without a simultaneous increase in complexity in the individual interactions (Berg 1999, p. 391). This is illustrated when the physician in the 'brain injury' group employs the ICF to ask the nurse additional questions to keep the discussion going and ensuring that important details related to the case are properly treated. As sufficient time is a reiterating problem in hospitals, the ICF contributes in defining how to structure things:

"The time must be tightly scheduled and the individual professional must have structured their survey results in such a way that they can be presented quickly and clearly in accordance with the template" (occupational therapist)

In addition, organising meetings in accordance with the ICF promotes a shared meaning of the case (Carstensen and Sørensen, 1996 p. 18) as well as establishing a "common object" Rogers (1993 p. 296). The ICF establishes a structure in the meetings that is not based on professional guidelines. Therefore it curbs how the profession itself defines the content and the organisation of work (Freidson 1970; Gieryn, 1999). This makes it easier for the participants to contribute in the discussions and evaluate each other's judgements.

Note also how the discussion is far from a typical "reporting" context where each professional worker in turn informs what she has performed as regards the patient. The heterogeneous and compound aspect of the case is emphasised as it involves the patient's everyday context, his current situation and his own expectations. Everything must be evaluated

as a whole. As several different professionals work together, coordination work plays an important role in order to achieve a common ground, the agreement of further work strategy and the organisation of work.

Questioning the role of the ICF in interdisciplinary meetings

It is Friday and the end of the first week of a four week stay for the group of patients with chronic pains. During this week the different professions have conducted observations, examinations and evaluations. Now the pain-team has a meeting where the purpose is to agree on treatment- and rehabilitation objectives of the patients. Six persons are present: a physiotherapist, two occupational therapists, a physician, a nurse and a social worker. Everybody is female except for the nurse. They all seem to be in their late thirties or early forties. The context appears rather informal and relaxed. They make jokes and laugh. Some drink coffee. The current discussion centres on how they will organise the rest of the meeting as they have recently tried some new work approaches. The role of the ICF is essential. An extract of the discussion is presented below:

PHYSICIAN: Now, we have two systems we can adhere to ...we have our usual meeting system (she points to the standardised ICF template which she holds in her hand) or this one (pointing to a sheet on the table). For instance ...I suggest that I inform you about the reason for referral and then Sissi (while turning to physiotherapist Sissi) and I can tell what we found.

OCCUPATIONAL THERAPIST-1: (a bit surprised) But then we start in the completely wrong end (she picks the ICF-template from the wall), we should start with "Environmental factors".

PHYSICIAN: Yes, if we are going to follow that one, we start in the wrong end (again pointing at the template the occupational therapist is holding), but we can start here ...or ...but we can as far as it goes follow it, but we must narrow down the problem ...

SOCIAL WORKER: I feel that it is important to include what you (all) have talked about with the patient and what we have talked about with the patient

PHYSICIAN: Yes, everything must be on the table.

PHYSIOTHERAPIST: (while turning to the physician). I suggest that you tell us about the problem, then gradually we can inform about the Environmental factors and Body Functions and structure (some of the others nod) ...I feel that this is the most correct thing to do.

PHYSICIAN: That is by the way the method we ...

OCCUPATIONAL THERAPIST-1: Yes ...it is in a way how we have agreed to do things (the others are nodding)

PHYSICIAN: Now, we have two systems we can adhere to ...we have our usual meeting system (she points to the standardised ICF template which she holds in her hand) or this one (pointing to a sheet on the table). For instance ...I suggest that I inform you about the reason for referral and then Sissi (while turning to physiotherapist Sissi) and I can tell what we found.

OCCUPATIONAL THERAPIST-1: (a bit surprised) But then we start in the completely wrong end (she picks the ICF-template from the wall), we should start with "Environmental factors".

PHYSICIAN: Yes, if we are going to follow that one, we start in the wrong end (again pointing at the template the occupational therapist is holding), but we can start here ...or ...but we can as far as it goes follow it, but we must narrow down the problem ...

SOCIAL WORKER: I feel that it is important to include what you (all) have talked about with the patient and what we have talked about with the patient

PHYSICIAN: Yes, everything must be on the table.

PHYSIOTHERAPIST: (while turning to the physician). I suggest that you tell us about the problem, then gradually we can inform about the Environmental factors and Body Functions and structure (some of the others nod) ...I feel that this is the most correct thing to do.

PHYSICIAN: That is by the way the method we ...

OCCUPATIONAL THERAPIST-1: Yes ...it is in a way how we have agreed to do things (the others are nodding).

The physician suggests rearranging how to conduct the meeting whereupon occupational

therapist-1 picks the ICF-template from the wall, strongly arguing that their meetings still must be organised in accordance with the ICF. This underscores firstly, the *recursive* aspect of coordination as "the established arrangement (the agenda) is treated as the field of work of another cooperative effort, namely that of rearranging the agenda (Schmidt and Simone 1996, p. 158). Secondly, it also underscores how the potential change of work is not automatically reflected in the state of the tool (Schmidt and Simone 1996, p. 178). Lastly, it emphasises that the employment of a tool such as the ICF is not without costs. Much work is necessary in order to maintain it as a "living" coordination mechanism.

Producing the interdisciplinary report – coordination across time and space

We are in physiotherapist Sissi's office. She is about to start producing the interdisciplinary report for a patient, which will accompany him when he leaves the hospital. The role of the report is to contain documentation of what has happened during the stay as well as providing necessary instructions for the receivers of the reports, who generally are health personnel in the municipal health service. As the contact person for the current patient, it is Sissi's responsibility to initiate the report. Gradually, the other members of Sissi's team will participate in the writing.

As the physiotherapist logs on to the computer, she has the letter of referral at hand, the daily rehabilitation plan for the patient, her own physiotherapy notes and the paper based patient record. She creates a new document, which also includes the ICF template. She writes the reason for the referral as she reads it from the patient record. In addition, she writes the medical history. Parts of this are quite similar to the content of the patient record, but an important exception is that she translates Latin medical expressions (like cervical column and stenosis) into common Norwegian in order to make it understandable and useful for the patient. She copies the social background from the rehabilitation plan. She also reads from her personal notes. The department has made a fundamental choice not to include personal notes in their patient-related documentation because, as one occupational therapist puts it,

“Then we would undermine the loyalty towards interdisciplinary work”.

At a later stage, she may decide to also produce a specialised physiotherapist appendix. Then it will point to the physiotherapist examination and explain what has happened and what has functioned properly. The appendix is thus aimed at other physiotherapists and not at the patient or others. However, the number of these appendixes has decreased significantly after they a year ago started to produce a common interdisciplinary report.

After a while, the physiotherapist writes down the agreed-upon treatment objectives from the surveyor meeting. Finally, she writes the goals related to body functions and structure. She says that the ICF-classification makes the work with the report a bit hard since it cuts across disciplines along the presented dimensions and they have to adhere to these dimensions at every step of their writing (see Figure 3). The others in the team will fill in information in each of these ICF-categories.

Some days later, Audhild, the occupational therapist in the team, is now ready for adding information to the report. One of her tasks is to write about the patient’s reduced control of his right side and in particular his right arm. Accordingly he has problems using tools and has problems doing things in sequence. This is expressed by hampered activity during meals and the morning care.

In her office Audhild logs on to the computer and finds the report that Sissi previously has initiated. In the meantime both the social worker and the nurse have contributed with entries in the report. Audhild scrolls down to get an overview of the current state of the report. The report is now over four pages long and reflects that it is a complicated case. At one place she corrects the content. She says, “somebody has not been precise enough. It says that the patient has been on sick leave for two years, but it should rather be one year sick leave and one year rehabilitation”.

Audhild scrolls further down and adds information in the different ICF-categories. This enables her to split up her contribution in different parts and add information according to ICF-categories. She must decide what to put in

each category. She spends some time writing and the length of the text becomes extensive. Extracts from different parts of the report related to the patient’s right arm problem is presented below:

Goals, Body function and structure

“The patient wants to achieve good strength in the musculature around his right shoulder.

...

Goals, Daily activities

Be able to use the right arm in all normal activities”.

...

Measures, Body function and structure

“Daily training with physiotherapist has focused on regaining stability in the patient’s right arm in order to improve contact with the right side of his body”

...

Measures, Daily activities

“The patient is asked to ‘include’ his right arm in all activities and the different daily situations is now prepared in such a way that it promotes the use of the patient’s right arm”

...

Goal evaluations:

“The patient still has some reduced control of his right side, but he is independent in every movement indoors ...”

During the writing process, Audhild considers what the others have written in order to make it fit in a linguistic sense. This means that she not only adds text, she also makes changes of what is already written in the report. She also replaces existing sentences. In addition, she has to consider her own sentences carefully. For example, she decides to move a text segment relating to home-related activities from the category “participation” to the category “Environmental factors” in order to make it fit with her own contribution. The nurse in the team originally wrote this part.

While reading the category, “measures related to work and spare time”, she stops for a minute and reads more thoroughly what the social

worker has written. She obviously misses something in the text as she adds a question in italics to the social worker. She writes: "Shouldn't there be more here ...who is responsible for following up the economic situation of the patient?"

The production of the report illustrates how the ICF coordinates activities across different times and different places (see e.g. Berg 1999; Schneider and Wagner 1993). The report is produced in such a way that the patient's medical history, environment factors, etc. are organised through the use of the ICF. Consider how some patient stays can be quite long and how the process of producing the interdisciplinary report goes on during the whole period. This means that the different professionals to a lesser degree need meetings to inform each other of the status of the case. Consequently, the ICF feeds directly into the work itself and is "instrumental in alleviating the need for *ad hoc* deliberation and negotiation (Schmidt and Simone 1996, p. 162).

Another point is that this way of working creates a continuity of work and contributes to an increased overview because the ICF coordinates work centred on a patient for the whole stay, sometimes several months. The fact that the quantity of disciplinary reports (now appendixes) has decreased is an expression of the fact that their main focus is their common reports.

As they now have to read and participate in each other's contributions, both make the ICF a foundation for learning and new understanding as well as "allowing" the participants to express explicit expectations of each other's contribution, which is the case when Audhild asks the social worker for more information.

Analysis

Providing and maintaining a common ground

A common artefact – such as the ICF - supports cooperative work by enlarging and enriching the area of shared information. This is the case for both the discussion in the meetings as well as the process of producing reports. This means that the ICF provides actors with an overview of information, which is distributed over space and

time, including the work of other professionals (Schneider and Wagner 1993, p. 234).

An enormous challenge, however, is how to construct representations that are meaningful to all health professionals who work with a patient. The Department of Rehabilitation has solved this by deciding to de-emphasise the role of distinct disciplinary documents. Personal notes are exempt from their official documentation and disciplinary reports appear only as appendixes to their ICF-based reports. Such a decision is not easy because 'the necessity to construct shared documents questions the specialist's unique ways of labelling and solving problems' (Schneider and Wagner 1993, p. 233). It is expressed by a therapist comparing the traditional way of producing reports with the way they do it in this department:

"In traditional departments, the reports are based on a previous referral, a case, and a produced report, done! In our department, on the other hand, we must continuously coordinate with each other and evaluate our contributions against what the others have. And really, it is demanding if you come from a place where you are used to work in a more limited manner with your own things".

This implies that new boundaries between the different professionals must be established and continuously maintained. It is conform to Gieryn's (1999) notion of boundary work, which in this context underscores that it takes an effort to negotiate the line between private and public spaces. This takes us to the next general argument, that an 'additional collective commitment to shared tools often leads to additional work' (Rogers 1993, p. 310) that often is invisible. An example is when the physiotherapist, Sissi, struggles with the interdisciplinary report and complains that adhering to the ICF is hard as it cuts across disciplinary dimensions. Another example is when the role of the tool itself is questioned and maintenance work is required to keep it "alive".

Transforming work

Although there is traditionally a hierarchy in hospitals, each profession possesses some autonomy, which is considered their domains (Gieryn 1999) or "what is essential is control over the determination and evaluation of the

technical knowledge used in the work” (Freidson 1970, p. 185-186). In other words, the professions are involved with the patient at different stages and they are doing their work in accordance with their professions’ norms and values. Committing oneself strongly to an interdisciplinary approach, however, influences this control and possibly redistributes it. By regarding both of the discussions in the interdisciplinary surveyor meeting, it is obvious that the traditional hierarchy and the authoritative physician’s role are challenged, as the physicians themselves acknowledge:

“The work practice was new, the physician’s role was both different from what I was used to as well as different from how I had learnt it should be (...) it takes some time to learn it, especially the work practice with a high degree of interdisciplinarity and the interdisciplinary meetings with the patient at the centre.” (Physician)

The ICF contributes to this transformation as it defines the framework of the discussion as well as imposing a specific order on it. For instance, the medical elements (Body Functions and structure) appear only as the third topic to be discussed. This is of course influenced by how the professionals have decided to approach the patient. Nonetheless, it also expresses an interesting development between physicians and other health workers, where one of the difficulties of generating unified patient files reflects the fact that medical and nursing knowledge are not equally valued (Schneider and Wagner 1993, p. 241). The ICF feeds directly into this relationship between the professionals. A physician explained:

“The physicians have a relatively small role in the interdisciplinary team because they are not the leader in such a group like they are used to in a traditional department. They become one member of a team and perhaps it is rather narrow to work with 6-7 different professions in a very special way.”

Another example of how work is transformed is how the decision to use interdisciplinary reports has changed the professional focus. The focus in these reports has changed from information interchange between peers (example: hospital physiotherapist and municipal physiotherapist)

towards a stronger focus on informing the patient. Consider for instance how the physiotherapist takes her time translating Latin medical expressions (like cervical column and stenosis) into words more useful for the patient.

Global reach, local use

The ICF is a mechanism that has not grown up from the local context. The department has in fact chosen to implement a global mechanism as the starting point. On the ‘global’ level, the ICF represents the comprehensive view, the ideological framework for what this department is doing as well as the acknowledgement that incoherent contributions are insufficient when dealing with complex cases:

“Within the field of rehabilitation, we need a common framework [ICF] or an ideology; for instance, there is a connection between body impairment and how to manage things in everyday life. You can draw lines to participation in community life or may consider the connection between what you manage to do and how satisfied you are with different aspects of life. This means that everything is interconnected and accordingly must be regarded as a whole”. (Chief physician)

However, the big question is how does a global tool become useful in a local context for different professionals? Symon and Ellis (1996 p. 3) warn that ‘a potential danger with current CSCW systems is that their design is predicated entirely on the formal procedures – ignoring (and even damaging) the informal practices’. It is pretty obvious that for the physicians, the employment of the ICF allows an increase in complexity in their role as meeting coordinators, which is illustrated where the physician in the ‘brain injury’ team actively uses the ICF to coordinate a complex case. For the other professions the immediate gains are found elsewhere. It is well known that in collaboration between different professionals, the participants possess different negotiation powers as they represent different professions carrying with them various degree of credibility (Fujimura 1996, p. 145). An occupational therapist describes how they considered the ICF to be useful in their local context:

“We wanted to put the focus on the patient rather than the profession. Consequently we

wanted to avoid that the physician spoke first, then the psychologist, then the physiotherapist (...) and then, last of all, the nurse”.

As a result, for the therapists and the nurses, the ICF was considered instrumental in blurring the boundaries between the different professions, as the use of it induces that:

“You avoid that it becomes a kind of display of ‘what I have done and what I have surveyed and I have found this and that’. It becomes a kind of display of disciplinary capacity (...) a kind of competition or actively position-taking, which is a very bad foundation for the negotiations” (occupational therapist)

This illustrates that usefulness in a local context is essential for the adaptation of a global tool. On a global level, the ICF is intended as a classification system for categorising the patient’s condition. But on a local level, it has transformed into a mechanism that plays an essential role in the organisation of work. As the ICF is translated into a local context, it also gives different meaning for the professionals. It is a tool that serves different roles, a boundary object (Bowker and Star 1999) dependent on the perspective. For the physicians, it constitutes a highly appreciated coordination mechanism, and for the therapists and the nurses, it is a mechanism that enables the redistributing of power among professionals.

Conclusion and implications

It is not difficult to argue that the implementation of large-scale EPRs has an organisational aspect that must be considered carefully. However this case illustrates that organisational structure is definitely not locked and unchangeable. The heterogeneous amount of professionals in the Department of Rehabilitation managed to change both the work-practice as well as improving coordination supported by the employment of the global classification system ICF.

Even if coordination in this case occurred within one department, it shares some resemblance with the challenges of coordination work through an EPR. First, it involved coordination among many different professionals, which also an EPR is supposed to do. The department also chose to start out with a global coordination

mechanism in order to promote a common ground for the health personnel as well as promoting a complete picture of the patient’s condition. Accordingly, there might be some lessons learned for implementing large-scale EPRs.

The employment of a global tool such as the ICF ensures the existence of a stable basis or common frame of reference in the uncertain process of making sense of the patient’s condition. It also ensures a certain degree of stability in a situation where each professional is supposed to adjust her work and change her focus towards a common understanding. However, this approach presupposes that a tool such as the ICF exists, having the power to bridge local peculiar contexts. Unfortunately this is not always the case and thus there is no alternative but to build on existing contextualised work environments. In particular, this has been emphasised in studies conducted by Ellingsen and Monteiro (2003) and Hartswood et al. (2003).

Given that such a mechanism exists or in other ways is provided, this study illustrates that the employment of a global tool such as the ICF may contribute in improving coordination as well as ensuring a common ground and a changed work practice. It must be emphasised that adhering to a tool like the ICF is not without costs. It implies hard work. The users must recognise and acknowledge the additional work that goes with it. Part of this work is to decide what to preserve and what to change of the existing practice. In this study, the users decided to let go of disciplinary appendixes in order to aim their work more specifically towards the ICF-structured interdisciplinary reports. They also decided to replace some of the Latin expressions and vocabulary with Norwegian common language. Disciplinary notes in their electronic documentation were abandoned. These fundamental and far-reaching decisions and results shaped their apprehension of themselves as professionals. The participants had to accept that some of their professional assessments were evaluated in a more critical perspective. The key question then becomes who is to decide what to change and what to preserve in such processes? There is no easy answer. A lesson learned from this study is that

the only people who can make such decisions are the users themselves. Hartswood et al. (2003) also argue the importance of user-led processes in order to map the use of EPRs to local circumstances, interpretation and understanding. However, the conclusion from the current study takes the argument about user-led processes a bit further as it pinpoints how far it is possible to reach in shared efforts to change work when the users themselves remain in control.

The changes that happened in the Department of Rehabilitation did not happen over night just like that. The way work changed extended over time. For instance, the quantity of disciplinary reports decreased considerably during the first year the ICF was used, and as the usefulness of the ICF was exploited. Also the role of the ICF itself was questioned, evaluated and adjusted when needed. Nobody could possibly foresee the role the ICF obtained in a local context. It was translated into a means for the therapists, which (in their own eyes) promoted their professionalism. For the physicians, the ICF proved valuable for coordinating meetings when dealing with complex cases. For the EPRs, this implies that a strategy of a total and one-stroke replacement (or implementation) of a large-scale EPR is wasteful. It disregards the professionals' capacity to suggest, try, experiment and implement changes that go beyond the flexibility capacity of an implemented large-scale EPR. Such processes cannot be conducted overnight, they require time, weeks, months and years. This implicates that it is simply not possible to construct the one EPR that inhabits the degree of flexibility capable of supporting the users' willingness to change their work. Accordingly, implementing EPRs should be done in a piecemeal fashion conducted over time.

The employment of the ICF illustrated that the structuring made by the ICF was made on a relatively superior level. The fine-grained classification possibilities in the ICF were not employed. This enabled the users to use free form writings within each ICF-category. That is, the patient's condition was not reduced to a situation where the case was described by codes and predefined text strings. Accordingly, the narrative character of the previous reports' was

preserved in the common report as this was considered extremely important for the participants. In addition, the common report together with the narrative emphasis enabled the users to address each other informally, such as when the occupational therapist asked the social worker about her contribution in the report. This implies that the shape of and degree of coordination mechanisms must be carefully designed not to replace what is considered particularly valuable in daily use. A structure on a superior level may be more inviting for different professionals who are used to different degrees of structure in their work. Structuring on a superior level will also promote increased flexibility in local translations. This is underscored in the present study, where the global ICF was translated differently into local use. It also managed to be considered useful across professional boundaries in spite of various perspectives of its role. As a result, its local use legitimised and enforces its global validity.

References

Atkinson, P. *Medical talk and medical work*. Sage Publications Ltd, 1995.

Berg, M. "Accumulating and coordinating: occasions for information technologies in medical work," *Computer Supported Cooperative work (CSCW)*, (8), 1999, pp. 373-401.

Berg, M. "Practices of Reading and Writing: The Constitutive Role of the Patient Record in Medical Work," *Sociology of Health and Illness*, (18), 1996, pp. 499-524.

Blume, S.S. *Insight and industry: On the Dynamics of Technological Change in Medicine*, MIT Press, 1991.

Bowker, G. and Star, S. L. *Sorting things out: Classification and its consequences*. MIT Press, 1999.

Carstensen, P.H. and Sørensen, C. "From the social to the systematic: Mechanisms supporting coordination in design," *Computer Supported Cooperative Work (CSCW)*, (6:4), 1996, pp. 387-413.

- Egger and Wagner "Negotiating Temporal Orders: The Case of Collaborative Time Management in a Surgery Clinic," *Computer Supported Cooperative Work (CSCW)*, (1), 1993, pp. 255-275.
- Ellingsen, G. and Monteiro, M. "A patchwork planet. Integration and Cooperation in Hospitals," *Computer Supported Cooperative Work (CSCW)*, (12:1), 2003, pp. 71-95.
- Freidson, E. *Profession of Medicine: A Study of the Sociology of Applied Knowledge*. The MIT Press, 1970.
- Fujimura, J. H. *Crafting Science: A Sociohistory of the Quest for the Genetics of Cancer*. Harvard University Press, 1996.
- Giddens, A. *The Consequences of Modernity*, Cambridge: Polity Press, 1990.
- Gieryn, T. F. *Cultural Boundaries of Science: Credibility on the Line*, Chicago: University of Chicago Press, 1999.
- Grimson, J.; Grimson, W.; Hasselbring, W. "The SI challenge in health care," *Communications of the ACM*, (43), 2000, pp. 48-55.
- Hanseth, O. and Lundberg, N. "Designing Work Oriented Infrastructures," *Computer Supported Cooperative work (CSCW)*, (10:3), 2001, pp. 347-372.
- Hartwood, M.; Procter, R.; Rouncefield, M. and Sharpe, M. "Making a Case in Medical Work: Implications for the Electronic Medical Record," *Computer Supported Cooperative work (CSCW)* (in press), 2003.
- Hutchins, E. *Cognition in the wild*, MIT Press, 1994.
- Klein, H. and Myers, M. "A set of principles for conducting and evaluating interpretive field studies in information systems," *MIS Quarterly*, (23:1), 1999, pp. 67-94.
- Law, J. "Technology and Heterogeneous Engineering: The Case of Portuguese Expansion," in *The Social Construction of Technological Systems*, W.E. Bijker, T.P. Hughes and T. Pinch (eds.). The MIT Press, 1987, pp. 111-134.
- Lærum, H., Ellingsen, G. and Faxvaag, A. "Doctor's use of electronic medical records systems in hospitals: cross sectional survey," *British Medical Journal*, (323:7325), 2001, pp. 1344-1348.
- NBH "The Patient Record: content, grouping and archiving of patient documentation in somatic hospitals," *Norwegian Board of Health*, 1994.
- Rogers, Y. "Coordinating Computer-Mediated Work," *Computer Supported Cooperative Work (CSCW)*, (1), 1993, pp. 295-315.
- Rolland, K.H and Monteiro, E. "Balancing the local and the global in infrastructural information systems," *The Information Society*, (18:2), 2002.
- Schmidt, K. And Simone, C. "Coordination Mechanisms: Towards a Conceptual Foundation of CSCW Systems Design," *Computer Supported Cooperative Work (CSCW)*, (5), 1996, pp. 155-200.
- Schneider, K. and Wagner, I. "Constructing the Dossier Representatif: Computer Based Information-Sharing in French Hospitals," *Computer Supported Cooperative Work (CSCW)*, 1993, pp. 229-253.
- Smith, D.E. *Texts, facts, and femininity: Exploring the relations of ruling*, Routledge, 1990.
- Svenningsen, S. Subtle Displacement of Work and Risks: On Electronic Patient Records in Danish Hospitals (submitted to SJIS), 2003.
- Symon, G., Long, K. And Ellis, J. "The Coordination of Work Activities: Cooperation and Conflict in a Hospital Context," *Computer Supported Cooperative Work (CSCW)*, (5), 1996, pp. 1-31.

Van Maanen, J *Tales of the field. On Writing Ethnography*, The University of Chicago Press, 1988.

Walsham, G. *Interpreting information systems in organizations*, John Wiley, 1993.

Zack, M.H. "Managing Codified Knowledge," *Sloan Management Review*, (40:4), 1999, pp. 45-58.