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Abstract

Cooperation and collaboration are an inherent part of the daily work performed at a hospital in general, and among nurses in particular. However, the technologies that support these work practises are still inadequate. In this case study, we explore the standardization process in nursing practice, and how standards are used across departments in a hospital environment in order to share information and knowledge. We explore what issues are at stake when standard care plans are used across organizational boundaries. Moreover, we examine the following: a) the adjustment of nursing classification in local practice; b) the tension between different standards; and c) the use of standard plans as a bridge to share information across various context.

Keywords: standardization, nursing care plan, electronic patient record, boundary object.

1   Introduction

"Continuity of care" is the vision of the national strategy for electronic cooperation in the health and social sector in Norway, and the strategy considers electronic interaction to be crucial to ensure the free flow of information that is necessary for achieving this goal (Norwegian Ministry of Social Affairs and Health 2008, p. 72). Furthermore, cooperation and coordination are vital for achieving continuity of care across geographic, professional and temporal boundaries. However, information sharing in health care is not a straightforward issue. Health care has changed dramatically in the last decade. Increased specialization and the development of new medical technologies have led to new therapies, increased professionalization, new expertise and new demands for coordination and cooperation. Seamless care, integrated care and shared care have been investigated from different perspective within the IS community (see, for instance, Ellingsen and Monteiro 2003). Key elements within this research field are standardization and infrastructural arrangements for integrated care. In accordance with increasing demands to share information within and across distributed sites, the use of nursing classifications, care plans and standard plans have been adopted by many hospitals. However, standardization in nursing practice has generated heated debates within the nursing community. Part of the criticism has been related to both the risk of increased fragmentation, and the sorting out of clinical knowledge that is achieved in situational, clinical practice (Bowker and Star 2000; Benner 2004; Suchman 2007).

To empirically address some of these challenges, we draw on a case study on the implementation and use of electronic nursing care plans in a surgical ward. The work at the ward is highly interdisciplinary and nurses play a key role in observing and monitoring patients 'needs, and assessing and carrying out pre- and postoperative procedures. During this phase, the patient is moved between several departments: from the surgical ward to surgery, to the post aesthetic care unit (PACU) and back to the surgical ward. Taking care of patients along this trajectory is a collective task and requires cooperation among nurses across disciplinary and spatial boundaries. Accordingly, all information and knowledge about the patient must be exchanged across various contexts. It is by now a well-established fact that standardization involves negotiation between local and global elements, and that there are some costs (Rolland and Monteiro 2002), and trade-offs (Carlile 2004). Similar studies have illustrated how medical information is bound to the context of its production (Berg and Goorman 1999), along with some of the challenges in sharing and assessing domain- specific knowledge across boundaries within an organization (Carlile 2004). This paper builds on these studies in order to increase our understanding of the dynamic interaction that takes place at the boundaries between specializations in large-scale information systems, such as electronic patient record (EPR). Specifically, we ask the following research question: How are standards used across specialties in nursing practice, and what are the consequences? We contribute to the traditional theories on standardization and boundary object by characterizing standardization as a negotiation process among different perspectives of practice.

The structure of this paper is organized as follows. We begin with a brief theoretical description of standardization and boundary object in relation to nursing, followed by a section on methodology. Our study of the use of an electronic care plan in a surgical and post anaesthesia care unit is then described, and the main finding presented. Finally we discuss our findings in light of recent insights and analyze the role of electronic care plans in cross-organizational interaction.

2   Standardization

Globalization and an increased reliance on large- scale information technology have involved an on-going transformation of modern organizations and everyday life. In this transformation, standards remain the sine-qua-non in virtually all fields of information technology. Previous research has mainly considered standards as being technical artefacts that are part of programming languages,

communication protocols and exchange formats (Schmidt and Werle 1998). The increased complexity and scope of standardization in our "networked" world requires a conceptualization that is typically broader than it has been in past research, and involves investigation from various streams. Fomin, Keil and Lyytinen (2003) provide a framework for analyzing standardization as a process of design, sensemaking and negotiation (Fomin, Keil et al. 2003). Similar studies emphasise standardization as being a dynamic interaction in a socio-technical network (Hanseth and Monteiro 2001). A key feature is the dynamic interaction between actors in the network, both human and non-human. Scholars within similar traditions have defined standards as any set of agreed upon rules for the production of (textual or material) objects (Bowker and Star 2000), or as a measure established by authority, customs, or general consent to be used as a point of reference (Timmermans and Berg 2003, p. 24). Thus, standardization is a process of rendering things uniform (ibid. 2003), facilitating coordination, and addressing multiple aspects of the interaction between technology and society (Schmidt and Werle 1998). From these perspectives, standardization is not just a technical issue, but also a negotiation between technical artefacts, humans, work practice, procedures and so on.

A hospital information system is a particularly interesting area to study standardization processes, since standardization is embedded in efforts to improve efficiency and quality in health care (Timmermans and Berg 1997; Ellingsen, Monteiro et al. 2007). Communication breakdowns have been identified as a leading cause of errors in health care, and a more uniform and consistent communication between care givers is recommended (Nadzam 2009). Along with the implementation of the electronic patient record (EPR), standardization has attracted increased attention in health care in general, and in the nursing practice in particular.

2.1   Standardization of nurses' work

Standardization in nursing is considered to be a powerful movement and has been an on-going process over the last two decades. National strategies for the implementation of EPR in Norway consider standardization to be a means to improve quality, increase effectiveness and save cost through the use of information and computer technology. In the nursing community, there has been special attention directed toward the use of terminologies, decision support and knowledge-based nursing. Terminologies in nursing are developed in order to create a common language with uniform definitions that reflect nursing practices, and consider the use of classifications as a means for improving nursing documentation within and between various health care professions (NNO 2009). Health care data must serve multiple and diverse purposes, like day-to-day documentation of care processes, management of care, identification of best practice, triggering of clinical guidelines and facilitating communication within the health care team (Moen, Henry et al. 1999).Thus, documentation and clinical work go hand-in hand, where documentation is an inherent part of nursing practice. Timmerman and Berg (2003) distinguish between four types of standards: design standards, terminological standards, performance standards, and procedural standards. In nursing practice, terminological and procedural standards are of special interest. Terminological standards in nursing have attracted increased attention during the past few years, and the international nursing community has been the driving force behind the formulation of nursing classification systems. Consequently, a number of different nursing classifications have been developed and are in widespread use. However, some scholars are sceptical to what they consider to be oversimplified reductions of knowledge embedded in nursing practice, which are typically used in the formal classification schemes (Benner 2004). Bowker and Star (2000) express the same scepticism to sorting things out that do not fit into standardized categories. Similarly, Orlikowski (2002) points out that "tacit knowledge is a form of knowing, and thus inseparable from action because it is constituted through such action"(Orlikowski 2002, p.251). However, as we have already indicated, nursing classifications have been embedded in the electronic documentation of nursing, and facilitate use of care plans. Procedural standards are another category of standards that are increasingly used in nursing. These are clinical practice guidelines that delineate how to proceed in meeting specified conditions in practice. Examples of this are how general practitioners should precede when they suspect a new case of diabetes, or what steps a

nurse should follows in preventing decubitus ulcers (Timmermans and Berg 2003). Accordingly, there is an increasing use of standardized plans, guidelines, and protocols as an integrated part of nursing documentation. Although some fear that the use of guidelines will lead to "cookbook medicine", Timmerman and Berg (1997) also elaborate on how the use of "protocol allows more complex and detailed treatment plans to become possible. Once implemented, the protocol can articulate activities and events over time and space – staff members can delegate coordinating tasks to it, transforming the nature of their work."(Timmermans and Berg 1997, p.296). Furthermore, they emphasize, "how standards manage the tensions among transforming work practices while simultaneously being grounded in those practices. Similar studies by Bowker and Star (2000) illustrate how standardized applications are an attempt to regularize the movement of information from one context to another. . From these perspectives, the tension between standardized care plans and local practice is a dynamic process, and illustrates how standards span the boundaries between the diversity of specialties (Bowker and Star 2000).

2.2   Standardization and boundary objects

One characteristic of nursing classifications is that they can inhabit multiple contexts at once, and contain both local and shared meanings. According to Bowker and Star (2000), it is in this tension between different meanings of an object that boundary objects arise. Boundary objects are defined as " objects that are plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" (Star and Griesemer 1989, p. 393).Boundary objects are particularly interesting in this study since standardization in nursing practice involves the distribution of information and work across multiple contexts. On the one hand, nursing classifications have been prepared by nurses in the international community and based on professional concepts. On the other hand, nursing practice involves several disciplines that cover patient care from "cradle to grave" across organizational, geographical and cultural boundaries. In this interaction, sets of boundary objects arise directly from the problems created when two or more differently naturalized classification systems collide (Bowker and Star 2000, p.297).

The literature on boundary objects has attracted a great deal of attention in a variety of studies and is recognized as a key player in the coordination in the coordination of knowledge and its transfer across boundaries. Pawlokowski and Robey (2004) studied IT professionals in organizations, and found boundary objects to be a critical element in the on-going convergence between the shared system and the practices that they connect. A study by Carlile (2004) illustrated the increased effort required to share domain-specific knowledge as circumstances at a boundary grow more complex. Boundary objects can have many forms and functions. For example, they may be shared IT applications (Pawlowski and Robey 2004), Intranet applications (Levina and Vaast 2005) and standardized forms (Bowker and Star 2000). Many of these studies have emphasized the challenges and difficulties in sharing and coordinating across boundaries. In our study, we want to focus on how boundary objects arise (Bowker & Star) and what boundary objects are in use (Levina and Vaast 2005). In addition, we also seek to focus on the framework developed by Carlile (2004) as an iterative process of transferring, translating and transforming in order to share domain-specific knowledge across boundaries. Furthermore, we contribute to the literature on the changing dynamic of boundary objects as while many studies describe them as being relatively stable and static, we examine how a boundary object is a dynamic actor in a hospital environment.

3   Method

The empirical setting investigated is a surgical ward and a post-anaesthetic care unit (PACU) at a regional health enterprise that is spread out over three different localizations. The hospital has approximately 5,600 employees and deals with 50.000 admissions each year. In recent years, the hospital has made major efforts to standardize the hospital infrastructure for computer technology.

This comprises a shared Electronic Patient record (EPR), a uniform storage system in radiology (PACS) and a joint laboratory computer system. In this study, we have focused on the exchange of information before and after surgery, paying special attention to nursing documentation. More precisely, we have followed the patient during the preoperative phase of a surgical bed unit, during the postoperative phase of a post- anaesthesia care Unit (PACU) and further follow-up at the surgical ward.

Surgical wards at the hospital are organized by specialty, and we have largely followed patients who were admitted to a mixed ward for gastrointestinal surgery and ear, nose and throat surgery. The patients in these wards are admitted to either elective or emergency surgery, and the unit has 24 beds. Positioned in close connection to the surgical ward is the post-anaesthesia care unit (PACU). Patients are admitted here from all units in the hospital, and caring for patients (adult and paediatric) following surgical interventions or procedures requiring general or regional anaesthesia. The surgical patient journey between different units at the hospital requires a seamless flow of information to ensure continuity of care and treatment. Throughout this journey, information is assessed, produced, interpreted and communicated, and it is an on-going activity embedded in clinical practice.

The methodological approach of our study is inspired by the interpretive tradition of field study in information system (Klein and Myers 1999) and the empirical data was primary collected through interviews and participant observation. During the summer and fall of 2010, the first author carried out 140 hours of observation of the work practices of nurses in the surgical ward, and in a PACU to gain insight into the historical, social and local context of information work at the hospital. Observation followed daily work routines with a special emphasis on their tasks related to the exchange of information between nurses inside the surgical ward, and between different wards/departments. To gain additional insight into the information work, the first author also carried out five semi-structured interviews with nurses, as well as informal conversations with staff. Most interviews lasted from one to one and a half hours, and were tape-recorded and subsequently transcribed. During the interviews, we had access to the EPR system, and the informants were asked to show and describe how the care plan and classifications were used in daily practice, and also about any subsequent changes after their implementation. Finally, they were asked about any challenges regarding the use of the system and how they solved them.

The process of collecting data and its analysis has oscillated between fieldwork, case description, and the use of related literature in order to gain new theoretical insight. It has been a process through which our understanding of the social world has been constructed from empirical data that has been analyzed in relation to theories described in the previous section. This has provided new understandings, and in turn has informed further data collection. This iterative process continued until we had a rich description of events, meaning and action involved in the information work in the wards.

4   Case

4.1   Background

Information work is an essential part of the pre- and postoperative work practice, and is strongly embedded in daily work. Over the past decade, patient records at the hospital have been gradually digitalized. The first version of the EPR was implemented in 1999 and the most recent significant implementation project has been the introduction of an electronic nursing module. The project started in 2007, and over the past two years all departments at the hospital have changed from paper to electronic nursing documentation. The major goal of implementing the nursing module was to replace the existing paper-based nursing documentation, and to improve the quality of documentation. The electronic nursing module is an integrated part of the EPJ system, and has been developed to support nurses' daily reporting routine, as well as a structured nursing care plan which supports the assessment, planning, implementation and evaluation of nursing care.
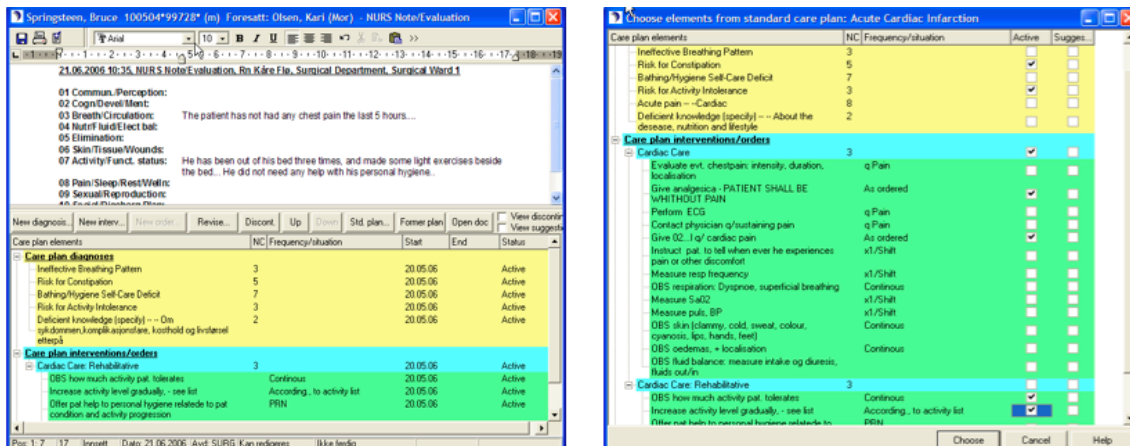
Figure 1.   *On the left side is a screenshot of the care plan in which the yellow part represents nursing diagnoses and the green part nursing intervention. On the right side is an example of a standard plan.*

At the core of the nursing module is its shared terminology, which is tailored to support nursing practice. Nurses apply this terminology to describe the patients' problems i.e., nurse diagnoses: They link each problem with one or several interventions, detailing what to do in particular situations. The new nursing module consists of the international classification system North American Nursing Diagnoses Association (NANDA) and Nursing Intervention Classification (NIC). Both NANDA and NIC are research based and widely used internationally.

Over the past few years, there has been an extensive implementation project to make use of the electronic nursing module. It has put special emphasis on applying the care plan as a means to and support for improving the documentation of nursing. Particular attention has been directed at developing "standard care plans", or guiding plans. Each ward/specialty has developed standard plans for the most common illness trajectory and these have been authorized by the professional leadership and made available in the electronic nursing module. For example, the surgical department has composed a standard plan for postoperative care. The most common nursing diagnoses and intervention for post-operative nursing are listed in the plan. (Figure 1). Thus, the plan serves as a guide and gets customized to each patient by selecting from the predefined list. Furthermore, a great deal of effort has been directed at using a standardized language in the standard plans as a means of ensuring a common understanding of nursing diagnoses and interventions. Since the standard/guiding plans are available in the electronic nursing module, they are used as a support in daily work as well as a means of sharing information and knowledge across professional and spatial boundaries.

4.2   Information sharing in local practice

The main goal of the preoperative phase is to physically and mentally prepare the patient, for the surgery, and the electronic care plan has become a key player in the coordination and performance of preoperative investigation and nursing care. To prepare for meeting with the patient, the nurse reads demographic data, referral and medical history. For further assessment of the patient's preoperative status, the nurse carries out an interview with the patient. When practical tasks are performed, the nurse returns to the nursing office to continue documentation and further planning. An extract from field notes illustrates the documentation process:

The nurse finds a vacant computer and opens a new document in the EPR system. Chooses admission note/Care plan and starts to create an electronic care plan. Typically, a "standard plan" is used as a support to create an electronic nursing plan. This option is available from the menu screen in nursing documents. When she clicks the tab "standard plan", the screen displays a list of standard plans that

are developed at the hospital and made available in the EPR system. All the plans prepared by the ward are marked with the prefix "GAS" to illustrate that they are relevant to gastrointestinal surgical patients. The nurse searches and selects the guiding plan for "GAS stoma pre and postoperative care". From this guide, she selects the appropriate nursing diagnoses, interventions and actions. In order to adapt the plan to the patient, she chooses "Lack of knowledge related to the stoma. Then she chooses the intervention "Teaching: Written / oral information about having a stoma". Moreover, she chooses interventions like "Insertion of peripheral venous catheter" "and nutritional therapy". Once she has chosen the relevant intervention, she clicks "OK" and the plan is created. She also skims a general guiding plan for pre-operative nursing care to check if there are additional nursing diagnoses or interventions that should be documented in the plan. When the plan is established, she specifies interventions and enters comments, such as insertion dates of peripheral venous catheter before she saves the document for further follow-up later on her shift.

When the plan is established, it acts as a support in the planning and coordination of care and treatment. In further clinical work, nursing diagnoses and interventions are assessed and evaluated, and before the nurse goes off duty, she must write a status report and then approve the document. When the next shift comes on duty and opens a nursing document in the EPR system, the electronic plan is available and serves as further support for pre-operative care and treatment.

After surgery, and after recovery at the PACU, the patient is moved back to the surgical ward. Information and documentation have to be revised in accordance with changes in clinical condition. When the nurse has carried out her clinical and practical tasks, she continues to audit the care plan in relation to the postoperative trajectory. Often, the same nurse who was responsible for the patient before surgery takes care of the patient at the ward after surgery. If this is not the case, the nurse becomes familiar with the patient by reading the electronic nursing notes and other information in the EPR. An extract from the fieldnotes illustrate further work on the electronic care plan:

Nurse opens new nursing note in the EPR where the care plan is part of the document. She starts to close the nursing diagnosis and intervention, which are not valid anymore. Then she continues to create new nursing diagnoses and opens the guiding plan GAS stoma. She chooses the nursing diagnosis "Risk for infection related to invasive procedures, operation wounds, peripheral venous catheter." She skims through the list to find appropriate nursing interventions and selects "Monitoring of skin," Monitoring vital signs "," Treatment of incision site" and then selects suggested action according to the guidelines. When all relevant nursing diagnoses and interventions are selected, she continues to write a status report in the upper part of the document. In the report, she doesn't need to repeat information already documented in the plan, only deviations from the plan and the current condition of the wounds, reaction to pain medication and so on. To make sure that she remembers everything about the fluid balance, pain and wound management, she skims through the printout of the anaesthesia and postoperative records before she saves the document

After using the electronic nursing module for several years, most of the nurses find it useful in daily practice and since NANDA and NIC is an essential part of the standard plans, they have become accustomed to using a standardized language.

4.3   Situated information in a new context

While planning and follow-up characterize nursing work at the surgical ward, the work at PACU focuses more on situational actions immediately after surgery, as well as anaesthesia. A dynamic environment characterizes the work at the unit where coordination, collaboration and clinical work go hand-in-hand throughout the day. The unit has 14 beds, all connected to monitoring equipment to measure and collect data from the patients on vital parameters. The beds are placed in an open space that gives staff the opportunity to have an overview and awareness of on-going activities. In the middle of the open space, in the opposite side of the patient beds, there is a nursing workstation. Behind the desk at the workstation, nurses have access to telephones, computers, central monitors,

paper-based documentation, etc. The location of the workstation gives the nurses an overview of patients at a glance while he/she also has access to important information sources.

While all wards at the hospital have implemented all of the features of the electronic nursing module, the PACU has chosen to use just the nursing note, and not the electronic care plan and nursing classifications. So far, they cannot see how a shared electronic care plan can be used for intensive care and postoperative patients. A quote from an intensive care nurse illustrates this challenge:

"When a patient is admitted to the intensive care unit or postoperative unit, everything is reset. The patient's needs and problems are very special during this phase and many of the problems and interventions that are important when the patient is with us are no longer relevant when patients are transferred to a regular ward". (Nurse)

In addition, postoperative units have for several years used a specially designed electronic record that is integrated into the monitors that are used during the pre- and postoperative care process. The application is configured to support local practices and needs, and also allows free text documentation. Data is stored in a local network, but is not integrated with the EPR system at the hospital. However, the electronic anaesthesia and postoperative chart has become an important information source at the unit as illustrated by an excerpt from field notes:

When the patient arrives at the PACU, the nurse anaesthetist connected the patient to a bed monitor and certain devices to automatically monitor vital signs (ECG leads, automatic blood pressure cuff, oximeter), which is a routine procedure for patients who have undergone surgery/anaesthesia. The bed monitor is connected to the local network and the anaesthesia nurse retrieves the anaesthesia records from the monitor. All data from the anaesthesia trajectory is stored in the system and the nurse anaesthetist uses the electronic record as the basis for the oral report. The location of the bed monitor makes it possible to read the information while also having a clinical view of the patient. When the nurse anaesthetist has given his/her report, the intensive care nurse fetches the electronic postoperative record in the same system and registers arrival time and scrolls through different screens to check trends, fluid balance, medications, etc. To get an overview of the patient, she uses clinical data (skin colour, level of consciousness, pain) as well as data from the bed monitor. The location of the monitor by the bed makes it possible to record data in the electronic postoperative records while she continuously makes a clinical assessment of the patient.

The extract illustrates the dynamic interaction between nursing practice and documentation in this phase. Occasionally, they use the electronic nursing note to seek information or to document certain items, but often it is only documented in the postoperative record.

I read the nursing notes from the ward more often before when I had a paper document at the bedside. I could then skim through the papers while I monitored the patient. Now I have to go behind the desk to read, but it's difficult when I have the responsibility for several newly arrived patients. (Nurse)

The quote illustrates some of the challenges of using the electronic nursing plan in this phase, where information and documentation must be visible and available at all times.

4.4   Information sharing across different practice

A key feature of the electronic nursing module is the ability to use standard plans across departments. As mentioned earlier, all departments have made standard plans in relations to nursing practice in their departments. These are available in the electronic system and can be used across departments as shown in the quote below:

All of the standard plans/guiding plans that are composed within different departments and are available in the system are a great resource. Particularly when there are cases about which I am uncertain. The last time I used a "standard plan" was just a few days ago when I had a patient who was going to surgery and who had other problems as well. I selected the option "standard plan" from the menu bar in the nursing note, and then searched for "Med" and thereby got an overview of all the

plans composed by the medical department. I looked through several of these plans and finally found some nursing interventions that were relevant to my patient. (Nurse)

Although this example shows how information and knowledge are used across departments, it has not yet become common practice. Preparation of "standard plans" was a major priority in the implementation of the electronic nursing module. The strategy was that "standard plans" would support both daily documentation work and decision-making in clinical practice, and provide a knowledge base that was available across departments and specialties'. The aim was to visualize and share local knowledge, both within and across departments. There has been extensive efforts to prepare these plans and the result is that today there are approximately 150 "standard plans" available in the electronic nursing module. However, while standard plans are widely used locally, they are not used as expected across departments and disciplinary boundaries. Some nurses use this opportunity, but many are not secure enough about the usability of these "standard plans" as they are prepared by other departments. The quotes below illustrate some of the challenges:

The use of "standard plans" has not quite lived up to our expectations. Since we often have patients with complex problems, it may be useful to fetch standard plans prepared by other departments or specialties. For example, many of our patients have diabetes as a supplemental diagnosis. There is a "standard plan called "Diabetes" available in the system, but it has not been updated and maintained over the past two years. Consequently, we would rather choose to create nursing diagnosis and intervention from scratch by searching in Nanda and Nic. (Nurse)

I think many of the "standard plans" are made too specific and refer to local procedures. Interventions and actions in the plans should have been broader to make them more useful across different wards. (Nurse)

The quotes above show some of the uncertainty of using standard plans and the tension between local practice and cross-contextual usability.

5 Discussion

5.1 Translation to local practice

One of the main reasons for using classification in nursing practice is to make visible what nurses do on behalf of the patient, and to promote communication by ensuring that there is a regularity in semantics and objects from one to the other (Bowker and Star 2000). However, some scholars in nursing practice are sceptical toward standardization, because categories belie the logic of caring practice, and trade one form of invisibility for another (Benner, 2004). In our study, the use of classification and care plans largely made the documentation of nursing practice visible in the EPR. First, classifications have been embedded into "standard care plans" and adjusted to the local language and practice. Just consider how the nurse selected nursing diagnoses like "Deficient knowledge related to stoma, preoperative" from the standard plan. Furthermore, the nurse selected intervention as "Teaching: Procedure/treatment" and selected action from a predefined list in the "standard plan". "Deficient knowledge" is a NANDA diagnosis in the same way as "Teaching" is a NIC classification. These are examples of very broad classifications that require specification to be useful in daily practice. By using the "standard plan", where NANDA and NIC are specified in advance, it becomes easier to make a care plan and adjust the classifications to local needs. This example illustrates how standardization is "do-able" in light of local needs, and this re-articulation of the classification is a sine qua non for the functioning of classifications (Timmermans and Berg 1997). Moreover, NANDA and NIC have been translated into local needs and has become a boundary object for facilitating interaction among nurses in local work practice. When one nurse makes the care plan, it is available

for the next nurse who takes over the responsibility for the patient. The nurse can then use the same care plan to get an overview of planned and completed nursing diagnoses and interventions and further revise the plan. Similarly, when a patient is transferred from another ward at the hospital, they can continue to use the same nursing care plan because it is available in the electronic nursing module. In this way, the use of electronic care plans provides support in daily documentation as well as a guide in clinical work. Another key feature of the system is the use of "standard plans" across departments. As illustrated in the case, they have become shared objects among nurses for exchanging domain-specific knowledge. Just consider how the nurse from the surgical ward used the standard plan from the medical ward as a guide in the assessment and planning of intervention for the particular patient. This shows the flexibility of multiple interpretations, and how domain-specific knowledge was moved from one context to another. As a boundary object, they have to be locally useful and have a common identity in practice (Levina and Vaast 2005). This was also highlighted as the main motivation for investing time and effort in preparing all of the standard plans in the first place. First, it was considered to be an opportunity for sharing knowledge across hospital wards. Second, they had an opportunity to gather key users at the hospital to reach consensus about "best practice" grounded in knowledge and experience from diverse field of practice. In this way, they have managed to introduce a shared language for describing nursing as well as a common understanding of the use of care plans at the hospital. However, they were not used across different departments to the extent that is expected.

5.2   The twilightzone between various context

Some of the main challenges outlined in this case are the uncertainty based on the validity of the standard plans and the fact that they are made too specific for local practice. This implies that they becomes less flexible and do not allows for multiple interpretations among multiple users (Pawlowski and Robey 2004). First, the case illustrates the effort required to move domain-specific knowledge across contexts. This is consistent with the law of medical information described by Berg and Goorman (1999) . However, the challenge in our study is rather a question of transformation from one community of practice to another. The fact that local standard plans have been tailored to the particular ward and has been prepared by co-workers is one of the reasons they have become successful in practice. However, the same adjustment to local practice makes it harder to share across contexts and illustrates the tension between the local and cross- contextual use. Second, to transfer knowledge across context also involves some "cost" (Rolland and Monteiro 2002) and trade-offs (Carlile 2004). It is not just a question of "bites and bytes", but also a matter of transforming knowledge to achieve a common understanding. For example, if a patient with diabetes is admitted to the surgical ward it may be useful to select some nursing diagnoses or intervention made available in the standard plan from the medical ward, since they are specialized in providing care to this group of patients. However, there are some precautions that must be considered in relation to nutrition that is particular to a surgical patient. This illustrate the increasing effort required to adequately share and assess domain-specific knowledge as circumstances at a boundary grow more complex (Carlile 2004). As the case illustrate, some of the standard plans was made to specific to local practice and thus complicated the usefulness of standard plans across departments. In this case, when a semantic and pragmatic boundary is faced, it is a challenge to use the standard plan across domain- specific boundaries. Consequently, it requires the ability to transform the knowledge from a special domain to another and assess whether it is useful in the local practice. This may involve some trade-offs, and in some cases, nurses find it easier to create nursing diagnoses and interventions in the care plan from scratch. Third, the effort to share domain-specific knowledge is further complicated by different perspectives of nursing practice. Boland and Tenkasi (1995) argue that perspective making and perspective taking are the basis for transformation within and between communities of knowing and thereby the basis for open system control in knowledge work. Increased specialization in health care generally involves increased specialization of care such as surgical nursing and intensive care nursing and so on. Although all nurses have a basic knowledge, skills and expertise are enacted as part of a

community of practice. Related to this, Orlikowski (2002) emphasize that knowing is an on-going social accomplishment, constituted and reconstituted in everyday practice (ibid. 252). As a member of a community of practice, nurses develop and strengthen their own knowledge domain and feel confident within that community. Consequently, they are familiar with the standard plans that are produced in the local practice, but are less confident with standard plans that are prepared in a different domain. The challenge is to make sense of other perspectives of practice and enable interpretation to local practice.

5.3   Tensions between different standards used in practice.

Despite some challenges, classifications and electronic care plans are in widespread use at the hospital. One exeption is the PACU where they have decided not to use the electronic care plan or classifications. As the case shows, this implies some trade-offs between the electronic care plan and the electronic medical chart used by the PACU. However, they depend on a shared understandig to coordinate activieties to ensure continuity in the care process. While the electronic care plan is based on international nursing classifications (NANDA and NIC), the medical chart contains other types of standards like vital parameters (BP, ECG) as well as locally configured concepts to support the local practice. Lack of integration leads to a mismatch between the two information systems. On the one hand, there is a lack of technical integration. On the other hand, there is also a pragmatic level of integration. According to Calile (2004), a pragmatic view of knowledge, recognize it as localized, embedded and invested in practice. Thus, integration involves the capacity to represent different functional interest and facilitating transformation of knowledge across boundaries. Similarly, Boland and Tenkasi (1995) describes exchange, evaluation and integration of knowledge as a perspective taking process. The foundation of perspective-taking is the ability to take each other's knowledge into account and is consistent with our case. Just consider the different perspective of the care process among nurses in the surgical ward and the PACU. In the dynamic environment at the PACU, the work is characterized by situational actions where information and embodied knowledge guides interventions as an ongoing process. Accordingly, nurses at the PACU can not see how the electronic care plan is able to maintain their perspective of the care process. Thus, the electronic chart has become a major player in obtaining and documenting nursing care as well as a support in daily work. However, this tension between the two systems involves some "cost" and trade-offs as illustrated in the case. Moreover, the case illustrates some of the challenges of transforming information across different context as well as a jointly representation across two differnt community of practice.

6   Conclusion

In this paper we have addressed some of the challenges of standardization in nursing practice. The study showed how use of classifications and electronic care plans have affected how information are shared and how the use of "standard plans" have influenced the exchange of information and knowledge across organizational boundaries. However, the study also showed that there are several challenges such as workarounds, trade-offs, and negotiation between different perspectives of nursing practice. Moreover, the use of these standard plans is quite new and is a process that is constantly evolving. Further work is therefore interesting to follow how this standard is developing in a dynamic network over time.

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