

**Knowing in Practice - a Tool in the
Production of Intensive Care**

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Abstract

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The overall aim with the present thesis was to find out how intensive care is produced by focusing on the ICU staff's interaction with each other and the technological tools they use.

Theoretical perspective draws on socio cultural theory and the concepts accounting practices, morality in discourse and workplace research.

The method used is ethnography and the data has been collected through participant observations and interviews in an intensive care unit in Swedish health care.

The result is presented through four papers. The first paper shows that intensive care to a great extent is produced through routines. The division of labor is marked and taken for granted by the ICU staff. Verbal reports, visual displays and activities make the information available and shared understanding seems to make words redundant when the everyday practices are carried out. Further technology seems to be embedded in the caring of the patients. In the second paper the findings also show that technology intervenes in the division of labor and both challenges the ICU staff practical knowing and reformulates practice. The awareness of routine problems is connected to the ability to "see" and to the ICU staff members cultural/contextual knowing. Knowing in practice is transformed when new technology is introduced in the ICU environment. Problems are solved in concert often in a hierarchical way. The third paper in turn illuminates that the meaning of technology seems to be connected to the ICU staff's accounting practices, i.e. their experiences of intensive care, their education, how long they have worked in the ICU and their positions in the network. Accounting practices is also socially shaped by the interactions among the ICU staff. It is the knowing that has been developed over time and it is the knowing that new ICU staff members have to learn to become competent actors in the ICU environment. Furthermore it is found in the fourth paper that moral values are negotiated in assessments of patients, medical decisions, other professionals' competences and other institutions' activities. Thus it seems that moral values are embedded and intertwined in the ICU staff's everyday practices.

It is concluded that the ICU staff's competence i.e. knowing in practice could be seen as a tool to produce intensive care. And this knowing in practice could be described as situated and seems to be distributed between the humans and between the humans and the technological tools to make everyday practices flexible. The ICU staff do not solve problems solely through individual cognitive work rather staff members 'borrow' knowing from each other and solve problems in concert. Intensive care is produced here and now at the same time as the past is present in the everyday practices. The meaning is shaped in context and moral values are embedded in the intensive care discourse. In this sense intensive care could be described as a technically, cognitively and morally intense environment.

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PART B

Paper I- IV

PART A

Overview of the research
field and summary of the
papers

The text is composed in the following parts

- A Overview of the research field and summary of the papers
- B Following papers, referred to in the text by their Roman numerals
- I Wikström, A-C., & Sätterlund Larsson, U. (2003). Patient on display- a study of everyday practice in intensive care. *Journal of Advanced Nursing* 43 (4), 376-383
- II Wikström, A-C., & Sätterlund Larsson, U. (2004). Technology- an actor in the ICU: a study in workplace research tradition. *Journal of Clinical Nursing*, 13, 555-561
- III Wikström, A-C., Cederborg, A-C., & Johanson, M. (2007). The meaning of technology in an intensive care unit- an interview study. *Intensive and Critical Care Nursing*. (in press).
- IV Wikström, A-C., Johanson, M., Plos, K., & Cederborg, A-C. Morality in discourse in an intensive care unit- a field study. (submitted)

Introduction

The research interest in this thesis is to study how activities are performed in an intensive care unit (ICU). How activities are performed cannot be separated from communication (Bruner, 1996; Wertch, 1998). Nor can morality be separated from communication as moral values always are present when people communicate. Studies of communication can thus be a source for understanding moral values in different settings (Bergman, 1998). It is the interrelationship between cultural setting and its resources that create how we talk, remember, imagine and learn (Bruner, 1996; Wertch, 1998). From this theoretical starting point I want to study issues of human- human- machine communication to investigate how intensive care is produced and made sense of in a technological environment like the intensive care unit (ICU). Human-machine communication is not different from communication between humans. The same tools, such as human talk, written words and gestures are used and cannot be separated from the context where it takes place (Suchman, 1987). In this thesis I focus on how the ICU staff's knowing in practice emerges when they carry out intensive care, as human knowledge to a great extent is communicative. The thesis wants to explore the ICU staff's communication in connection to routine work and problem solving. Further, I want to understand how they make meaning of technology and how issues of a moral character are negotiated in the ICU context.

The development of technology and technological tools in our society has emerged at a rapid pace since the Second World War, which, in turn, has resulted in a complex society with a high degree of division of labour (Hutchins, 1995). One institution in society where the use of technological tools has developed at a very rapid pace overall is the Swedish health care. An environment in the Swedish health care where technology has advanced in particular is the Intensive Care Unit (ICU). In the ICU environments that formed in the early 1960s, seriously ill patients were treated and cared for by specially trained staff members, that is, registered nurses, enrolled nurses and anaesthetists, mostly together with supporting tools. The development and handling of new technological tools make the environment more complex, which, in turn, transforms the character of the intensive care staff's everyday work. In a complex environment like the ICU, division of labour between staff members and between staff and technological tools is shaped and re-shaped as the introduction of new technology in the ICU makes work more specialised. When entering the ICU, you, the patients and their

relatives are surrounded by technological tools in a high-technology environment (Jennet, 1986; Strauss et al 1985).

Almost all the technological tools in health care today are digital and can often replace human activities. Tools do not do anything in themselves but they can be seen as resources for the skilled personnel. The technological tools in the ICU are performing the tasks of different staff members; they regulate infusions and drug injections like the injection pump, the drip counter and the ventilator. Other tools such as the oscilloscope monitor vital functions such as pulse, blood pressure, and oxygen saturation, which otherwise would have been carried out by different staff members (c.f. Berg, 1997; Bosque, 1995). Human knowing has thus been transferred to the machines, which, in turn, change the everyday practice. Staff members in the ICU have to learn new things as well as being skilled in the handling of the technological tools. Technology here also encompasses traditional documentation with pen and paper as well as computerised documentation in addition to the handling of the above-mentioned technological tools (Berg, 1997; Berg & Harterink, 2004).

In the following text I want to present recent nursing research in the area of intensive care.

In the ICU, patients are seriously ill and vulnerable (Granberg, Bergbom Engberg & Lundberg, 1999) and the intensive care and treatment is supposed to successfully lead the patients towards wellbeing. This process is carried out by the ICU staff interacting with each other and with technological tools, trying to make the patients' problems manageable (Thelander, 2001). However, previous research of intensive care and nursing has mostly focused on what some researchers call the tension between technology and care in the ICU (Gjengedal, 1994; Söderberg, 1999; Barnard, 2000) and they claim there is a dichotomy between caring and technology. Gjengedal says that technology may narrow the nurses' perspective and obscures the patients' social needs, which in turn may depersonalise patient care, while Barnard means that technological tools have more impact on nurses' everyday practice than the needs of the patients. Other researchers like Cronqvist, Theorell, Burns and Lutzén (2001) claim that registered nurses in the ICU feel that technology restricts their freedom of action, that they are controlled by the work situation and that those dissonant imperatives can lead to stress. In a study that explored nurses and midwives' perception of computerized patient information systems Darbyshire (2004) found that the informants were predominantly negative to the technology at hand as the digital system did not capture 'real nursing'. In a phenomenological study, Söderberg (1999) emphasises that too much technology and too much treatment generate ethical dilemmas in connection with decision-making concerning withdrawing or withholding treatment in the ICU. Further, Svantesson,

Sjökvist och Thorsén (2003) assume that technology within intensive and critical care makes it possible to save more lives, which may create ethical problems to the physicians who are supposed to decide what is the most efficient and meaningful treatment in this situation. They also found that physicians seldom involved the patients' families or registered nurses in discussions before the decisions were made (ibid). In another study, Bunch (2000) also focuses on ethical dilemmas in critical care and she concludes that it is end of life questions, resource allocations and questions of justice in connection to organ transplants that create the ethical dilemmas which emerged in her study.

The aforementioned researchers focus on the impact that machines and technologies have on human beings, mostly registered nurses. Bosque (1995), on the other hand, has studied the functions of, for example, a tool that measures oxygen saturation and she means that the tool can act as the nurse's extended arm. Others like Barnard and Sandelowski (2002) and Barnard (2002) claim that technology is not necessarily juxtaposed to care. Instead they think that we need to examine the assumption of tension between the two. Further, Thelander (2001), who studied risk and security in intensive care, states that technology becomes incorporated in the caring of the patients in the ICU. It is in the network of people and technological tools that the tools come to life (Berg, 1997).

So far, studies of everyday activities in the ICU, encompassing interaction with technological tools have seldom been carried out (Sandelowski, 2002; Thelander, 2001). ICU researchers have mostly separated the social and the technical sides of intensive care from social actions and activities. Neither has studies encompassing different ICU staff members' meaning of technology or how they discuss topics of a moral character been carried out within the ICU research field. Therefore, the present study attempts to further understand the in situ organisation of the everyday practice in an ICU. Below both the general and specific aims are presented.

Aims of the thesis

The general aim is to study human- human- machine communication in an ICU. More specifically, I would like to find out how intensive care is produced or, to put it differently, find out what the ICU staff say and do. It is the ICU staff's interaction with each other and

with the technological tools they use that is the subject of analysis. The research questions are:

- 1 How do the ICU staff carry out routines in everyday practice?
- 2 How do the ICU staff handle routine problems?
- 3 How do the ICU staff make meaning of technology?
- 4 How are moral values negotiated in the everyday practice at the ICU?

In the following text I want to discuss perspectives of relevance to the thesis beginning with socio cultural approach encompassing accounting practices, morality in discourse and workplace research. Further I want to illuminate the concept competence

Framework

A socio-cultural approach

The notion of socio-culture is frequently used in many contexts, but it is seldom clarified. In the present thesis socio-cultural theory refers to a theory emanating from Vygotski (1978) followed by Wertsch (1998) and Säljö (2000). Key notions are: historical, cultural, institutional, contextual and situated activities, connected to communicative and mental actions (Wertsch, 1998). From a socio-cultural perspective, humans are created of and create their culture through communication, or as Shotter (2000) put it, through joint actions. It is the interrelationship between context, language and thought that is in focus which also is the case in the present thesis. The context including cultural, social and institutional factors influences the people in it, their actions and the way they create meaning (Wertsch, 1998; Säljö, 2000). Hence knowledge and meaning is negotiated and constructed in joint actions. One could say that people think together with each other through discourse; thus cognition is distributed (Hutchins, 1990; Resnick, Pontecorvo & Säljö, 1997). We act and learn together with other people. Others point out to us what to do or not do by, for example, reminding us what happened last time or what would be better to do this time, and vice versa. Accordingly, the thinking is not just going on inside our minds but is also distributed between our minds through communication (Hutchins, 1995; Shotter, 2000).

People also think together with tools or artefacts (Säljö, 2000). From a socio-cultural perspective artefacts can be understood as peoples extended arm or mind. Säljö (1998) refers to a Greek study where children were asked about gravitation. The conclusion of the interview study was that the Greek children could not explain gravitation. He replicated the study with Swedish children. However, they used an earth globe during the interview. The conclusion of that study was that the Swedish children could explain gravitation when they thought together with the adult interviewer and the artefact, the earth globe. Closely related to socio cultural theory is the concept of accounting practices which will be discussed below.

Accounting practices

Our perception being connected to our accounting practices has inspired the analysis of the meaning of technology. The concept accounting practices is seen as an analytic tool and can be understood as a guide to perception (Johanson, 1994; Suchman, 2000; Mäkitalo, 2003). Further, one could say that accounting practices “set limits for our vision but they also make it possible for us to see anything at all” (Johanson, 1994, p. 29). Staff members in different contexts learn how to read a scene or they learn their accounting practices (Suchman, 2000). Further, their learning and meaning making are negotiated through discourse (Cederborg, 1999; Goodwin, 1994; Johanson, 1994;; Kallmeyer, 2002; Shotter, 2000; Suchman, 1997; 2000; Säljö & Bergqvist, 1997). This negotiation is constantly going on and Wenger states that life itself is a “constant process of negotiating meaning” (1998, p. 53).

There are studies focusing on different accounting practices that show how physicians and patients (Atkinson, 1999; Johanson, 1994; Sätterlund-Larsson, 1989) teachers and pupils (Säljö & Bergqvist, 1997) or vocational guidance officers and applicants (Mäkitalo, 2003) perceive the same phenomenon depending on their different experiences. Suchman has also shown how staff members in the same law institution perceive the same phenomenon in different ways due to their knowing in practice (Suchman, 2000). In Goodwin’s words they create a ‘professional vision’, which direct the seeing and understanding of everyday practice (1994). The understanding of how to act in an institutional setting can hence be described as situated and achieved for practical purposes and thereby connected to the knowing in practice (Goodwin & Goodwin, 1998; Cederborg, 1999). However, in institutional contexts where different accounting practices exist, negotiations about how to understand various phenomena

is constantly shaped and re-shaped. Institutional staff members are negotiating meaning and this meaning is historically and contextually shaped and as Wenger put it: "Practice is about meaning as an experience of everyday life" (1998, p. 52).

Morality in discourse

The idea that it is through communication that people become moral human beings and that moral aspects always are present in human communication has also led to the analysis in the present thesis (Bergmann, 1998; Linell & Rommetveit, 1998). Shotter states that it is from joint actions, when people respond to each other's utterances and gestures that the practical-moral setting emerges (Shotter, 2000). However, as Bergmann says, people are not aware of that their doings are recognised as moral negotiations. Further, we are not aware of taking moral stances, when we are talking about matters connected to our attitudes to life, religion, health and social or political issues. Studies of morality have mostly placed morality inside the individual or in customs and rituals. However, morality in discourse is always present in everyday life and, as Bergmann (1998) as well as Shotter (2000) states, morality is handled in social interactions, e.g. in everyday language. It is through analysis of everyday interaction that morality becomes visible which also is the starting point for one of the research questions in this thesis.

Even if morality is present in dialogue the topics may differ due to the context where the communication is going on (Bergmann, 1998; Linell & Rommetveit, 1998; Goodwin, Pope, Mort & Smith, 2005). Other researchers state that moral issues above all are embedded in the health care discourse. Adelsvård and Sachs (1996) have studied how registered nurses try to guide male patients in their choice of life style by giving advice in a covered and neutralised way. Others like Herritage and Lindström have focused on how, as they put it, "motherhood and medicine collide" (1998, p. 397), when mothers come with their newborn babies to the health care services. The dialogues are not explicitly of a moral character, but in some ways the mothers are going to be assessed; am I a good enough mother? Hence one could say that morality and communication are two sides of the same coin since morality always is present when people talk to each other (Bergmann, 1998; Shotter, 2000).

Bergmann also states that morals (Latin) and ethics (Greek) often are used synonymously, as is the case in the present thesis. Further, Bergmann, referring to Goffman, claims that morality

in discourse “is not simply to be connected with norms” (Bergmann, 1998, p. 288), rather it is connected to utterances of respect or disrespect for a person in everyday communication. People usually do not explicitly express accusations or confrontations to each other. Rather the moral judgements can be observed in intonations and face expressions or disguised in irony or humour (Linell & Rommetveit, 1998). One topic of a moral character is blaming, which emanates from the idea that we always have different choices to make and in that we are responsible for our choices such as life style, religion and politics. Even the understanding of what is considered good or bad health can become a matter of more than just a physical capacity. Health can also be related to an individual’s will to change a ‘bad’ life style (Greco, 1993). Health care personnel then may argue that the person has himself to blame if he does not get well. Blaming unwell patients in this way is called victim-blaming by Crawford (1980) and Greco (1993).

Bergmann also states that, for example, professionals in health care institutions are trained to take a “neutralistic” stance in connection to patients and clients at the same time as much of their work include assessments and decision-making about the patients’ eating, drinking and smoking habits. Assessing in institutions like the health care system can also be seen as a way of maintaining a ‘feeling of inclusion’ or as Goffman puts it, maintaining a team of actors who cooperate in order to shape a definition of the situation for the public (1990). The shaping of the ‘feeling of inclusion’ in turn involves morality to a great extent as it includes rules and regimes for perspective on life, death and behaviour (ibid). Institutions like the health care system can, according to Goffman (1990), be seen from a cultural perspective as the moral values are fundamental in social institutions.

Workplace research

The present thesis also draws on workplace studies especially related to the research questions connected to routines and routine problems. Workplace studies “direct analytic attention towards the socially organised practices and reasoning” (Heath & Luff, 2000, p. 19) of collaborative work in technologically intensive environments. This encompasses talk, technological equipment, documentation and human interaction. The everyday practices are inseparable from interaction (ibid). In this sense, cognitive work can be seen as socially distributed (Hutchins, 1995; Heath & Luff, 2000). Hutchins and Klausen (1998), in a study of the work of a crew of three pilots in an airline cockpit, state that a complex job like flying a

jet plane “cannot be done by an individual acting alone” (p. 19). They argue that it is not only the individual pilot’s skill that determines whether the passengers live or die; rather it is the communication between the pilots together with the communication with the technological tools. This communication between the workers depends on the construction of a shared understanding of the situation, i.e. an inter-subjective understanding (Wertsch, 1998), which is the basis of collaborative work. This could also be seen as producing normal order, or routines (Suchman, 1997).

Routines constantly surround us in everyday life just as they do in the work- place, Hagstrom (2001) states. They are negotiated and can be seen as structuring everyday work. Routines are what newcomers have to learn from more experienced staff members and what they learn can thus be seen to be contextual and cultural phenomena. Routines are cognitive as well as communicative as they are built through language (ibid). Hagstrom (2001) further claims that routines can be studied through analysis of people acting with cultural tools and of people negotiating in everyday life. Often the routines are violated by various problems. Suchman (1998) refers to these as routine problems. There can, for example, be a plane occupying a certain gate when a new plane is on its way to the airport. This is a problem which the flight tracker has to solve with her knowing in practice. This could mean looking at the monitor where she can see the plane, looking at the time table and the radio log and back to the monitor. Suchman says that she manages to solve the problem “with a range of partial information resources with which she can assemble a coherent view” (1997, p. 49). Hutchins in turn talks about problem solving as the technique to move the problem from one domain to another, which makes the problems manageable (1990).

Other workplace studies have focused on how staff members cooperate within navigation, and Hutchins (1995) concludes that the activities at hand are too complex for an individual working alone to handle. Heath and Luff (2000) have studied how journalists help each other delivering news through cooperation in the news room even if the news does not belong to their own area. Others like Goodwin and Goodwin (1998) as well as Suchman (1987; 1997) have studied airplane crews’ coordinated actions in moment-to-moment analysis. As Heath and Luff put it: “Workplace studies are concerned with the work, interaction and technology in complex organisational environments” (2000, p. 8). Interaction is seen as synonymous with communication (Suchman, 1987) which, in turn, is seen as social action encompassing talk, gestures and physical representations (Resnick, Pontecorvo, Säljö & Burge, 1997).

Furthermore, Suchman claims that technologies and the handling of them can only be understood within the contexts where they appear. In Sweden there are workplace studies focusing on learning and information technology like Rystedt & Winman, (2004) who are studying health care personnel working with electronic journals. The studies explore how the electronic journal is received by mostly registered nurses and how the journal is re-shaped and embedded in the everyday practice. Consequently, workplace studies focus on the relationship between talk and material artefacts (Goodwin & Goodwin, 1998; Goodwin, 2005), and this is also the focus of the present study.

Heath and Luff (2000) state that although we know a lot about technology in organisations it seldom is studied in everyday practices. Further, Heath and Luff refer to Suchman who argues for the importance of ethnographic studies of the human-human and human-machine interaction within technologically intense organisations, i.e. workplace studies (Heath & Luff, 2000). Suchman (1997) also states that workplace studies differ from traditional research like Human-Computer Interaction (HCI). According to Suchman, HCI researchers claim that human actions are goal-oriented and driven by rules, scripts and plans while workplace studies focus on the “socially organised activities (Suchman, 1997, p. 42) in technologically intensive environments. Talk or communication cannot be separated from production or, to put in Heath and Luffs words: “The task is accomplished in and inseparable from the interaction” (2000, p. 221). People are collectively responsible for the work done; “they are in it together” (Suchman, 1997, p. 51).

Competence

The concept of competence focuses on individual professionals’ knowledge and skills in their work environment and is usually described as non contextual in that it has the individual as the unit of analysis. Ellström (2000) for instance says that an individual’s competence is depending on the individual’s potential ability to act in different situations. This is connected to the individual’s psychomotor; the cognitive, social and affective ability to act (Ellström, 2000). He also mentions individual competence connected to task, adaptability and progression ability and those professionals need formal knowledge. However, formal competence is not enough. Professionals must be able to transform formal competence to real competence in different situations. On the other hand, an individual can possess real

competence without having the formal competence and vice versa. Ellström (2000) has also studied the learning environment of an organisation where the focus is on aspects of what can be a hindrance and what can facilitate learning. The conclusion was that there are structural and/or individual conditions that can hinder and also facilitate learning in the organisation. Several studies of competence have focused on registered nurses' individual competence within different domains in health care, such as educational competence (Bergh, 2002), the intensive care nurse's competence and the chief nurse's competence (Nilsson, 2003).

In contrast to individual competence, Hansson (1999) has studied collective competence focusing on skilled interactive actions among team members who assemble chassis for trucks and a sailing team and special team that deals with employment issues. His conclusions are that skilled collective competence involves role playing, gestures, symbol and language, sense making, time and space, communion, exchange of meaning, familiarity and unity. Further, Hansson (1999) emphasizes role playing, and especially leadership, when explaining why one group of people acts better than another.

Unlike the concept of competence referred to above, where the unit of analysis is the individual or the collective of individuals, the concept of knowing in practice will be used in the present studies. This latter concept refers to relationships between people and people and tools in a certain context (c.f. Wells, 1999). The focus of the analysis is on the situated activity where the ICU staffs interact with each other and their technological tools. Below I will describe the history of technological tools

The history of technological tools

Jennett (1986) calls such a milieu as the ICU a high technology environment as it is furnished with complex and expensive technology for diagnosing and treating seriously ill patients. In the workplace research tradition, it is the interaction between humans and technology that is focused on and Jennet too states that "technology means the use of tools" (1986, p. 13). The development of the stethoscope in 1819 is often seen as a gateway to the technological revolution in health care (Reiser, 1978; Jennett, 1986; Wackers, 1993).

In the 17th and 18th centuries, before the stethoscope was invented, physicians had to rely on what the patients told them and also on the symptoms the physicians discovered by looking at the patients. Rarely did the physician feel the patient's body with his hands and often the only source of information about the patients' condition consisted of a letter. It was also during the 17th and the 18th centuries that an interest in the anatomy of the dead human body was awakened. The idea of discovering the genesis of different diseases led to tremendous advances in the exploration of the living human body. In 1761, the first method described in literature was developed to diagnose disease. This was percussion, which involved a physician tapping his fingers on the patient's body listening for different sounds. But the physicians did not want to touch the human body, it was described as too embarrassing for them as well as for the patients. Accordingly, percussion was not used until much later and percussion is still used in health care today (Reiser, 1978; Jennett, 1986; Wackers, 1993).

The interest in finding objective symptoms escalated and Reiser (1978) writes that physicians could read about the stethoscope in 1819 in *On mediate auscultation*. (stetho = the Greek word for chest and scope = I see).

The wish to "see" inner organs generated during the last half of the 19th century the development of the ophthalmoscope for inspection of the eyes, the laryngoscope for inspection of the larynx and the cystoscope to inspect the urinary bladder. In the beginning these techniques were used to develop the medical science, which also was the case with keeping records preferably on poor patients. However, in the early 20th-century the technology became central in the care and treatment of the patients. Young physicians were trained to use the technology in clinical work and the hospital organisation thus became more complex. Different special units emerged and the patients were transported around to be examined by physicians like radiologists and laboratory clinicians. The health care organisation was changed from a home for poor people to a prestigious institution with well educated physicians (Berg & Harterink, 2004). However, the technological revolution was constituted by the X-ray machine as X-ray pictures, just like the microscope, made it possible for several different physicians to examine and discuss what they saw at the same time and in neither case did the patient have to be present (Reiser, 1978).

Berg and Harterink (2004) claim that the graphic visualisation of breathing through the Spiro meter, the heart activity through electrocardiogram (ECG) and visualisation of the body

temperature also were revolutionary (2004). These graphical representations of the human body transformed subjective experience to objective representation and also made it possible for several physicians in concert to validate and diagnose the patients' symptoms, just like the X-ray did. The introduction of different technological tools generated a need for different types of skilled workers. Thus, nurses were employed to handle technology in health care and the physicians delegated most of the graphical visualisation examinations such as the ECG and the measuring of body temperature to them. New technology shaped new activities and the division of labour changed, which illustrates "the intimate relationship between work environment and the structuring of work activities" (Suchman, 1997, p. 45).

Another technological emergence was the medical record. In the early 19th century the medical record played a peripheral role to physicians, but gradually the medical record came to play a central role as the medical institutions developed (Berg & Harterink, 2004) and still does. However, patient records can today be written digitally as well as with pen and paper. After World War I, laboratories carrying out chemical examinations were established and it was hoped that specialisation would improve the accuracy in diagnosing diseases. Accordingly, specialisation lead to centralisation and the road of specialisation, centralisation and technology has been followed thereafter and still is (Berg & Harterink, 2004; Reiser, 1978).

The beginning of what we today call intensive care can be found in the rapid pace of technological development after the Second World War, and in 1957 the first units for "progressive care" were built in the USA (Wackers, 1993). It was the poliomyelitis epidemic that initiated intensive care in Sweden as well as in Denmark as the need for respiratory treatment grew enormously. In Sweden, the first ICU was opened in the beginning of 1960, but as long ago as in 1852 Florence Nightingale said that it would be valuable to create a place where seriously ill patients could be closely attended to (Jennet, 1986).

The first ventilator used was the so called "iron lung" or "total body" ventilator, the only ventilator developed before 1950. This ventilator worked from outside the patient with an electric pump that produced negative pressure in the patient's thorax.

In the early 1950s, one anaesthetist in the Blegdams hospital in Copenhagen introduced artificial ventilation with positive pressure for poliomyelitis patients. Medical students performed this artificial ventilation manually. The students were delegates for the mechanical

ventilator developed later (Suchman, 1997). The mortality rate sank from 90% to 25% when the poliomyelitis patients were ventilated with positive pressure, which, in turn, led to the development of mechanical ventilators. The first ventilator with positive pressure was the *Engström* ventilator, a large and clumsy machine, compared to the ventilators used today. The *Engström* ventilator was used in the Blegdams hospital in Copenhagen in 1952 (Wackers, 1993). In 2003 the ventilator is still seen as the most important lifesaving tool in the ICU, but today ventilators are small, digital and equipped with a range of functions (Thelander, 2001). There has been a tremendous growth of different technological tools used in the ICU environment, such as various invasive catheters to measure central venous pressure, artery blood pressure and oxygen concentration. Non-invasive tools such as the oxymetry, a tool to measure oxygen, have also been developed as well as different machines to monitor pulse rate and ECG. Dialysis machines have also been produced and used in the ICU (Thelander, 2001). Additional new technologies for electronic documentation have been introduced at the same time as paper and pen still are used (Berg, 1997; Rystedt & Winman, 2004). Alongside the development of the ICU technological tools, various drugs have been developed and introduced in the ICU, which also results in a need for increased monitoring of the patients' vital functions (Barnard & Sandelowski, 2001).

When performing this study I collected data from one ICU and the method used, the procedure of the data collection and the setting and the participants are presented below.

Method

This is a qualitative study drawing on ethnography and the empirical material, observations and interviews, has been produced within the project *Communication and Technology- a study in a technological environment in health care* (Sätterlund Larsson & Wikström, 1998). The studies have been carried out in an ICU in a medium-sized hospital in the West of Sweden.

Ethnography

It is the ICU staff's interaction with each other and the technological tools that is the subject of analysis. This thesis is focused on what the ICU staff do and say when they carry out

intensive care. Consequently, this study had to be carried out “in situ” (c.f. Heath & Luff, 2000), which means that the studies in the thesis has been carried out in the ICU context focusing on the ICU staff’s everyday practices in order to analyse the situated activities in the ICU context. Hence the method is drawing on ethnography, which seldom has been used in the ICU context (Thelander, 2001).

Ethnography is emanating from anthropology, which usually puts Malinowski at the forefront as the pioneer (Hammersly & Atkinson, 1983). Malinowski claims that the researcher has to start with, as he called it, “foreshadowed problems” (Hammersly & Atkinson, 1983), which would lead the researcher to interesting findings. This should not be confused with a hypothesis because, as Malinowski states, a hypothesis would merely be perceived as a hindrance to see anything at all. Further, Malinowski, as well as the following Chicago tradition, claims that ethnography always means a long stay in the research field (Jeffrey & Troman, 2004). Classic ethnography following Mead, Blumer and Glasser and Strauss state that ethnography study what people say and do in order to produce comprehensive descriptions of every day practices (Hammersly & Atkinson, 1983). According to Hammersly and Atkinson, Einstein (1936) once said that “The whole of science is nothing more than a refinement of everyday thinking” (1983, p. IIX). However, as an ethnographer you have to move back and forth between here and there, or to put it differently, to have an ‘emic’ or etic perspective, where ‘emic’ refers to the informants’ perspective and ‘etic’ to the scientists’ perspective on activities in the research field. Both perspectives are crucial to the ethnographer (Pilhammar, 1996). Workplace research following Heath and Luff (2000), Hutchins (1998) and Suchman (2000) is one kind of ethnographic study which focuses on interaction/communication between people and tools in technologically intensive environments. This type of workplace study has not been conducted within health care and that is why I want to see this thesis as an ethnographical workplace study within the ICU context. Ethnography, as in workplace studies, includes seeing, listening and asking questions (Hammersley & Atkinson, 1983). Consequently, the present thesis includes observations of situated activities within the ICU field and interviews where different ICU staff members participate.

Ethical considerations

In the autumn of 1997, the chief clinician at the ICU was contacted and gave his consent to the study. The next step in the process of entrancing the research field was to ask the anaesthetist and the registered nurse in charge of the unit for permission to conduct the study, which they granted.

The studies do not focus on the patients in the ICU but nevertheless as an observer I have come close to the patients' lives, their relatives' lives and the patients' somatic pathology. As the patients were mostly unconscious, it was impossible to ask for their consent. However, written information (Appendix 3, in Swedish) was posted up in the ICU informing people coming to the ICU that there was a study going on and individual relatives were informed in the patient's room. As was said before, the focus was on the staff members' interaction with each other and with the technological tools. It is the staff of the ICU as a whole that have been studied and not any individual staff members. Written information was also distributed to staff members in the ICU and to branches of national unions. The health care staff was assured of informed consent and confidentiality (Appendix 1 and 2, in Swedish). As I, the researcher (ACW), am a registered nurse as well as a teacher, I am bound by professional secrecy and ethical laws like every other registered nurse in health care. The Research Ethics Committee of the Medical Faculty, Göteborg University (L 285-98) has approved the study.

Setting and Participants

In the ICU, seriously ill patients are taken care of by anaesthetists, enrolled nurses and registered nurses. The doors to the ICU are locked; you have to ring a bell to be let in to the ward, which also the relatives have to do. This is due to the security as most of the patients are unconscious. There are several rooms in the ICU where just one patient is in care. There is always at least one enrolled nurse bedside, who never leaves the room without being replaced. The registered nurses are responsible for the patients' care and there are anaesthetists who are responsible for the medical care of the patients. However, another physician, such as a surgeon, can also treat the patients if they have been operated on, or there could be other physicians responsible for the patients' condition. The unit is heavily equipped with technological tools such as ventilators and oscilloscopes displaying the patient's physiology in terms of heart rate, blood pressure, and oxygen saturation. There is a constant beeping from the different machines as they are adjusted to make noises in order to make the ICU staff

aware of something being wrong. However, often the beeping is not 'seriously meant', it could be the patient moving in bed, coughing, or that some staff members perform caring activities. Sometimes the registered nurse asks the anaesthetist if she can 'increase the alarm', which means that the machines do not react quickly enough to changes. Once there was a room alarm that was beeping and all of the ICU staff but one ran towards the patient room. It was the registered nurse who was responsible for the patient and she said to me "I know there is someone leaning on the bell", which also was the case. She knew the patient's condition and from her perspective there could not be an emergency.

Further, the ICU staff often talked about how often health care personnel made telephone calls to the ICU to ask about almost everything. "They seem to think that we know everything" a registered nurse said, not without pride in her voice. Enrolled nurses also mentioned that enrolled nurses from other clinics often expressed anxiety about working in the ICU and admiration for whom that dared to work there.

The ICU, where the studies were conducted, cares for patients of different ages and with different diagnoses. In this particular hospital, the ICU is the only unit that can offer respiratory treatment and most patients in the ICU are suffering from breathing problems. All the registered nurses, enrolled nurses and often the anaesthetists participated in the studies as well as anaesthetist nurses on a number of occasions. Oral information about the project and my presence in the ICU was given to staff members in conjunction with the reports that were given every afternoon. They were told that the researcher, a doctoral student, would be in the ICU for some time observing and documenting what they did and said. Some of the staff were acquainted with me as I was a teacher in the ICU in the 1980s and some of the staff expressed their satisfaction with having a teacher who was "interested in reality".

Data collection

Fieldwork and interviews have been carried out as follows. In the autumn of 1997 the clinical management of the ICU approved the study. The research Ethics committees approved the study in the spring of 1998 and in the autumn 1998 the field study was introduced in the ICU. It lasted until the spring of 2000, i.e. for two years, as two years often is claimed to be standard within ethnographic research. This long a stay is very time consuming and Jeffrey and Troman (2004) refer to Walford (2002) who states that long term field studies likely are

more suitable for doctoral students than for tenured academics. As the present field study was conducted within a project that was to lead to a doctoral thesis, one could say that a long stay in the ICU context was possible to realize. However, the field study was divided in parts. Between the autumn of 1998 and the spring 1999 the field study was dormant and analysis of the collected data was conducted. Analysis was also conducted between the spring and autumn 1999. The analysis then made me aware of the activities and interactions that went on in the so called “Square”, a meeting place in the middle of the ICU where oscilloscopes displaying all the patients’ ECG, telephones, computers and different documents about almost everything going on in an ICU are placed. This awareness led to further observations focusing on the “Square” in the beginning of autumn 1999. After a seminar early in the spring of 2000 I decided to enter the ICU field again for a month to focus on the activities inside the patient rooms. This ethnographic time mode could be called “a selective intermittent time mode” following Jeffrey and Troman (2004, p. 540). They suggest that the time spent in field studies could last between three months and two years. It depends on what issues the researcher attends to.

Participant observations

The data material in paper I, II and IV encompasses fieldwork documented in field notes. Fieldwork includes observations and documentation of situated activities (Goodwin & Goodwin, 1998).

I started out by visiting the ICU three days a week. When I entered the ICU, I was met in the doorway since the ICU is a locked unit for security reasons and you have to ring a bell to enter the area. A registered nurse met me and gave me the code to the changing-room. I chose the same clothes as the rest of the ICU staff and followed the everyday work for about five hours a day in the mornings as well as in the afternoons and evenings.

The very first day of my observations, I started at the same time as the afternoon staff at 1.30 p.m., which is when they are given a report about all the patients in the ICU. On that particular day, several registered nurses and enrolled nurses had just returned from their holidays, which meant that the patients were as new to the staff as to me and we were all given a thorough report. After the report, the registered nurses organised their work and decided which patient they would care for. It was then natural for me to ask one of the

registered nurses if I could accompany her in her afternoon work with the patients. When entering the ICU, you take a look around, asking yourself what is going on here or, as Silverman (2000) ask; what do people have to know in this environment.

Other questions that guided my observations were; what do they do when they carry out intensive care, what kind of technological tools are there and how do the ICU staff interact with technology in their everyday work? I wanted to participate in the ICU as an observer, which meant staying close to the registered nurses and the enrolled nurses in their work, not participating directly, but being close enough to see and hear what was going on. Thus, observing one registered nurse and one or two enrolled nurses in their work with the patients in the patients' room was the beginning of my fieldwork.

The observation process could be described as funnel-shaped in that I did not know exactly what to focus on at first, but like Hammersley and Atkinson (1983), I would claim that the researcher should study "everyday life". This means observing what is happening, listening to what is said and asking questions; "in fact collecting whatever data are available to throw light on the issues" (aa p. 82). But as the fieldwork advanced, I was able to formulate what activities appeared to be most interesting to focus on, and the ICU staff then informed me and fetched me when, for example, patients arrived at the ICU. I also took part in different discussions, small talk, coffee and lunch breaks to fit in with the ICU staff and sometimes I felt 'like one of them', although at other times, I often at a distance just observed activities such as rounds.

Some of the enrolled nurses and the registered nurses asked me what I wanted to know about the ICU. They often told me what a fine working place this ICU was and how well their job suited them and that they worked in teams. Sometimes they asked me to help them with small matters like fetching things they needed. Once a registered nurse, who was attending a course in research methods, asked me "what kind of method is it you use?". Now and then I found it hard to be an observer. I had read that "as an observer you should act as if you were not here" so I decided not to answer the telephone. One day there were no ICU staff in the "Square" but I and the telephone rang. I did not answer as I "should act as if I was not there" and a registered nurse came after many signals from a patient room and answered. She looked at me. "It is for you", she said. After that I answered the telephone if it was needed. Sometimes enrolled nurses and registered nurses would say; "don't document this now" when they had

acted in what they thought an improper way and once they said to me “ please document that there are four physicians sitting in the office, do that”.

The observations were documented in conjunction with the activities studied or shortly thereafter. This was done because remembering correctly can pose a problem. Therefore, it is best to write things down as quickly as possible (Hammersley & Atkinson, 1983). No one reacted or asked about my field notes, which can be interpreted to mean that documenting occurs frequently in the everyday practice at the ICU. Time, place and activities were recorded in the field notes and also how I interpreted what people said and did and who participated. I sometimes also documented how people were positioned in the room. I also talked to different staff members and asked questions when I did not understand what were going on (c.f. Hammersley & Atkinson, 1983). Here an example of field notes:

Place: In the patient room

Participants: A registered nurse, a patient and I as an observer.

Situation: He shows 85 in blood pressure the nurse says looking on the display, I have to check again the nurse says. The registered nurse seems to think that it is strange that the patients' blood pressure is so low. She fetches the “the old” aneroid cuff and checks the blood pressure manually together with the stethoscope. Alright, it is correct.

Reflections

In spite of the digital technological equipment the nurse seemed not to trust the patients' low blood pressure. She had to control it with a less complex tool and then she accepts that the blood pressure really is so low.

Observation brings the researcher close to the research field and the observer is “inside” the environment at the same time as he/she must scrutinize the activities from the “outside”. What is observed is also connected to the researcher's earlier experiences of the research field. Or as Agar puts it, “The problem is not whether the ethnographer is biased; the problem is what kind of biases exist” and “by bringing as many of them to consciousness as possible an ethnographer can try to deal with them as a part of methodology” (1980, p. 42). The observer in the present project is familiar with the research field, which on one hand can set limits to what the observer might “see” as certain activities may be taken for granted. On the other

hand, experience from the field can be a resource for the researcher as seeing is always connected to cultural knowing (Goodwin & Goodwin, 1998). Accordingly, reflexivity is fundamental to the research process in order to prevent the researcher from 'going native' (Hammersly & Atkinson, 1983). However, being experienced in the research field may contribute to the understanding of the meaning in context, which is crucial to ethnographers. In order to test credibility, the data has been discussed and interpreted by me together with my supervisors and in different seminar groups. I have reflected on every step taken in the studies in order to ensure that I have studied what is relevant to the study and that the theoretical perspective has guided the data collection and the analysis. In the results, different excerpts are presented and analysed. Such handling gives the reader a chance to follow the interpretations made.

It is the situated interaction between staff members as well as the human-machine interaction that is focused on in the studies. Many of the cooperative activities that are taking place when the ICU staff carry out their everyday work are in the form of talk; and talk is action (Wertch, 1998). To capture the informants meaning of technology, interviews were conducted as follows below.

Interviews

Interviewing will be described in the following paragraph as the data in study III encompasses qualitative interviews (Kvale, 1997). Interviewing in this sense can be seen as a form of "discourse between speakers" (Mishler, 1996, p. 7). Also Gubrium and Holstein (2002) refer to interviews as communicative processes where the meaning is contextually grounded. The mentioned researchers thus criticise the standard stimuli response model and they plead for a more mutual attitude from the interviewer. Mishler (1996) calls an interview a speech event and he claims that it is not the preciseness of the interview questions that researchers ought to focus on because it is in discourse that indistinctness should be clarified. It is the researcher who has the intention to understand what the informants' utterances about different phenomena mean. The interviewer listens in an active way and asks open questions, for example "how do you mean?", "please explain what you mean" or "tell me more about that". Mishler (1996) as well as Kvale (1997) and Gubrium and Holstein (2002) describe open questions by emphasising that people express their experiences in a narrative way and that listeners encourage the speaker by saying "go on" or "what happened later on" and so on.

The data analysed in paper III was collected through interviews where twelve persons participated; four registered nurses, four enrolled nurses and four anaesthetists. The interviewees were selected from their level of experience, i.e. the amount of their working years in the ICU. The nurse in charge and the chief physician were asked to give the names of all the team members working in the unit. The two most as well as the two least experienced team members indicated by these two professionals were asked to participate in the study. They all agreed to participate. Registered nurses who had not been asked to participate wanted me to explain the criteria for not being chosen, which then was done in connection to their afternoon reports. Consequently, in each of the three groups there were two respondents who had more than 10 years of experience from intensive care, whereas the rest had worked in the ICU for less than two years. The health care staff members were assured that consent and confidentiality would be maintained. That is why the informants are not being presented with age, education or sex. To prevent recognition the anaesthetists are called he and the registered nurses and enrolled nurses are called she. A semi-structured interview guide was used focusing on the informants' everyday work, their relation to technology and ethical dilemmas. The interviews were tape recorded and conducted in a calm place within the ICU and they lasted from 45 minutes (physicians) to 90 minutes (some enrolled and registered nurses). The physicians told me that they were very busy and that we might be interrupted if someone needed them and they preferred to locate the interviews in connection to the afternoon report. The enrolled nurses and registered nurses also preferred to be interviewed in the afternoon when the evening shift had taken over the responsibility for the patients. The tape recorded interviews were transcribed verbatim and consisted of totally 222 written pages (anaesthetists 51 pages; enrolled nurses 75 pages; registered nurses 96 pages). The informants were invited to freely express their experiences of the technology in the ICU (for example "tell me how you handle technology when..."). The interviewer listened actively in order to detect nuances and to ask open follow up questions (why, how, when, which questions) that could deepen the understanding of their information.

Analysis

The unit of analysis in the field notes was the "situated activities" (Goodwin & Goodwin, 1998) encompassing human-human and human-machine interaction, i.e. what people did and

said. According to Polit and Hungler the qualitative data analysis should “impose some order on a large body of information so that some general conclusions can be reached” (1999, p. 500) Field notes were read at the end of each observation day to give ideas about what to focus on during the next observation day. It could be said that the analysis was dialectic in that it was inductive fieldwork, then “head work”; reading and reflecting on both the field notes and literature, back to field work and so on (Lather & Smithies, 1995). This could also be labelled abduction which is a common way to attend to data produced through field studies (Pihlhammar, 1996). Approximately, once a week I made fair copies of the field notes and that could be seen as the first analysis. In order to obtain an overall view of the whole data corpus (Silverman, 2000), the transcribed field notes were read and re-read several times. Interactions, activities and events that emerged and corresponded with the aim of the studies were noted as key words in the margin. One of the first themes I saw was in the ICU was routine work. Even if I had not been working as a nurse since 1980 I recognised the routines. Text segments that encompassed routine work was brought together and scrutinized. Now I detected that a routine like receiving a patient from the operation unit encompassed complex practices conducted by skilled personnel and I decided to focus my observations on the receiving situation trying to capture what the personnel said and did. Then those situated activities were analysed and finally I chose to present one of them in paper I.

Further, the routines were almost every day interrupted by more or less complex problems, which became the second theme and was analysed in the same way as the first theme. Most of all I found that moral issues were embedded in the everyday practices in the ICU. The issues discussed were not only about life and death; they could encompass assessments about almost everything. Key phrases and text segments about moral topics were brought together into themes and sub themes. In this manner, certain activities stood out as important. I also found that different staff members talked about the same tool, such as the oscilloscope, in different ways, which I wanted to explore through interviews.

The data from the interview study was transcribed. There were twelve interviews and I transcribed three of them myself and the rest were transcribed by a professional secretary. One could say that the analysis started when I transcribed the interviews. In the transcriptions that the secretary had written there were a lot of misunderstandings of what the informants had said especially in the interviews with the physicians as they used a lot of medical expressions that the secretary did not understand. Consequently those transcriptions were

controlled by me through listening to the interviews and reading the transcriptions at the same time which also constituted the first analysis of those interviews. The analysis was based on an inductive search for themes that could explain what technology meant to the different informants and how they made sense of the technology in their everyday practice. The first reading of the data gave an overview of what the informants had said. The first idea I had was to present the meaning through different voices drawing on Mishler (1996) and Sätterlund-Larsson (1989). However, I found that such a structure would not be fair to the informants. I re-read the transcriptions again and again, and by reading the transcribed text segments back and forth I coded the themes and the sub themes (c.f. Polit & Hungler, 1999). The analysis was performed through a consensus process where similar themes were clustered together and those not relevant to the study were excluded. In order to increase credibility the other authors checked if the examples and the sub themes fit under each theme as well as responded to the question of the study. Disagreement was resolved through discussion.

Methodological considerations

Field studies make it possible to come close to peoples every day practices often for a long time. As a participant observer I had the opportunity to get a primarily picture of what people did and talked about. This in turn may have had an impact on the activities at hand as I as an observer was present when the activities were carried out. Another problem with field notes is that while the observer is documenting, activities are still going on in the research context. Accordingly, it is not possible to document everything that happens. However, observation brings the researcher close to the research field; the observer is “inside” the environment at the same time as he/she must scrutinize the activities from the “outside”. In work place research data mostly is collected through video tapes of the situated activities. However in the present study it was not possible to video tape for ethical reasons. What is observed is also connected to the researcher’s earlier experiences of the research field. The observer in this study, also the first author, possesses extensive experience of intensive care. On one hand, that can obscure the perception but on the other hand, experience from the field can be a resource for the researcher as seeing is always connected to cultural knowing (Goodwin & Goodwin, 1998). Accordingly, reflexivity is fundamental to the research process and the trustworthiness of the studies (Hammersly & Atkinson, 1983). In order to test the credibility of the interpretation of the data, themes have been analysed in seminar discussions and among

the authors until consensus was reached. Trustworthiness of the results is also assured by giving examples from the interviews and excerpts from the field notes when describing different findings. However, to write articles about field work may contribute to losing part of the process of ethnography. There are content that can disappear between the seams. Transcriptions of interviews constitute a weak point in interview studies as they provide a further interpretation of an already interpreted situation. Consequently, studies of interviews provide a different discourse to communication in authentic settings (Mishler, 1996). Another limitation of the interview study is that only twelve professionals, four anaesthetists, four enrolled nurses and four registered nurses are represented in the interviews and that all of them are from a medium sized hospital in Sweden. On the other hand, the data in the thesis has been produced through technique triangulation (Hammersly & Atkinson, 1983) as different methods, interviews and observations have been used. This can also contribute to credibility.

Below I present a summary of the four papers included in the thesis.

Results – summary of paper I, II, III and IV

When intensive care is discussed, written about or displayed in television programmes, the intensive care unit (ICU) is described as a place where there are nurses and physicians constantly running around with syringes, infusions and blood and all the patients are suffering from cardiac arrest. During my stay in the ICU, I noted that the everyday work to a great extent consisted of routine practices such as rounds, reports, documentation and the recurrent activity of delivery and reception of patients coming from the operation unit. Although receiving a patient was routine work, it was nevertheless a complex situation involving different staff members, several technological tools and, of course, often an unconscious patient. In paper number one, such a delivery/receiving situation is scrutinized in a moment-by-moment analysis. However, every now and then the routines were violated by what I call routine problems. Routine problems in this sense mean situations in everyday work when staff did not know exactly what do and the routine work was interrupted or obstructed. In paper number two this phenomenon, and how the ICU staff solved the problems, was explored.

When analysing the field notes it seemed to me that technology was attended to in different ways by different ICU staff members. To find out how the enrolled nurses, physicians and registered nurses made meaning of the technology they handled in their everyday practices an interview study was conducted and the result is presented in paper number three. Another phenomenon that emerged in the field notes was that moral values were present in almost every situation and discussion in the ICU. It could be in connection with reports or rounds, dealing with questions of patients' life style or the behaviour of relatives, politicians or other health care personnel. This is focused on in study number four.

Paper I: Patient on Display- a study of everyday practice in intensive care

To obtain an answer to the question "How is intensive care produced?" a recurrent situated activity in the intensive care unit (ICU), the delivery and reception of a patient coming from the operation unit, has been analysed to show how technology is incorporated and supports the routine work. The study draws on workplace research tradition in line with Suchman (1987; 1997; 1998), as well as Heath and Luff (2000), who state that workplace studies are "concerned with work, technology and interaction" (p. 17). According to workplace research tradition, communication is seen as social action and cannot be separated from the production or the context in which it appears. This means that workplace research is carried out "in situ", i.e. it consists of naturalistic studies of technologically intense environments focusing on collaborative work. Accordingly, the present study was carried out in an ICU at a hospital in the West of Sweden. Participants in the study were registered nurses, enrolled nurses, anaesthetists and anaesthetist nurses.

Data was produced through fieldwork documented in field notes. The goal of fieldwork is to understand the participants' activities in everyday practices (Agar, 1980). The fieldwork and field notes from this study consisted of observations of work in patients' rooms when patients arrived at the ICU and when registered nurses and enrolled nurses were caring for the patients. Field notes were also written in conjunction with the physicians and the nurses giving medical treatment and these focused on what people did or said. Observations were documented in field notes written at the same time of, or shortly after, the observations. When the data was analysed, questions such as who did the talking, what did they talk about, what did they have to know and what actions did they take part in guided the analysis in order to

find an answer to the question: “What did they do when they carried out intensive care”? One theme that emerged from the data was the ICU staff’s collaborative activities involving routine practice. Collaborative work between different staff members often took place in different situations in the ICU. In the present study, one such recurrent activity involving routine practice, the delivery and reception of a patient coming from the operation unit, was explored.

One finding in the study was that intensive care to a great extent was produced through activities involving routine practices. Such a recurrent situated activity in the everyday work in the ICU was the delivery and reception of a patient coming from the operation unit. This delivery and reception formed a pattern where two phases could be distinguished. The first phase involved the interactions between staff from the operation unit, technological equipment and the ICU staff when the patient was delivered. The second phase involved how the routine work proceeded when the operation staff had left the ICU.

In phase one, the findings showed that everyone knew what to do when they took care of an unconscious patient whose life was dependent on the actions of the health care staff. For staff members, this was part of their routine work and they shared the same expectations, but it was nevertheless a complex task to perform. The actors’ location in the room was connected to their functions and work with the technological tools that surrounded them and the patient. The verbal reports, the “open” tools (Hutchins & Klausen, 1998) that monitored the patient’s physiology and the written information in the documents made the information available to everyone in the patient room. A shared understanding seemed to make words redundant when the activities of competent actors were coordinated. When the staff from the operation unit had handed over the report, they left the ICU and phase two started.

The ventilator breathed for the patient as he was incapable of doing so himself. But the ventilator could not decide how much oxygen or breathing depth the patient needed. It was up to the anaesthetist to decide on this as well as a number of the ventilator’s other functions. The ICU physician left the patient room when he had connected the patient to the ventilator. The technological tools that produce new information cannot combine the information themselves. The combining and interpreting of information is done by competent actors among the ICU staff. Technology mediates the patient’s physiological state, which is communicated to staff members. The human body is in some ways a human individual; as the anaesthetist nurse commented on an unconscious patient during the operation: “He has

behaved well". The ICU record is like a "chart" of the patient and provides physicians and nurses with information. The chart/record can be moved from the patient's room and constitutes a form of institutional memory (Latour, 1986). The enrolled nurse in the ICU is physically the closest to the patient and she is the one person who never leaves the patient room without being replaced. The anaesthetist is the staff member physically most distant while the registered nurse in the ICU bridges the gap between them.

It could be concluded that the technology is incorporated in and supports the everyday work in the ICU, but technological tools cannot communicate with each other. It is the communication between the staff members, verbal as well as written, that combines the information from the devices. The technological tools are shaped by human beings but the machines also shape the actions of the staff members in the ICU.

Paper II: Technology- an actor in the ICU: a study in workplace research tradition

This paper focused on how technology intervened and challenged the ICU staff's knowing in practice in the ICU. Practice in this sense meant organising work, division of labour, rules and routines.

In earlier studies of the ICU, especially during the late 1980s and the early 1990s, some researchers claimed that there was tension between technology and caring in the ICU and that technology would dehumanise the caring of the patient. In the present study, we argue that technology is a part of the task of carrying out intensive care.

The theoretical starting-point of the study was workplace research tradition, which focuses on collaborative work in technology intensive environments such as the ICU (Hutchins, 1995; Goodwin & Goodwin, 1998; Suchman, 1998; Heath & Luff, 2000). From a workplace research perspective, it is not possible to separate people's thinking from their doing or from the context in which the activities are performed. To put it differently, we argue that thinking and knowing are socially distributed since they encompass technological tools as well as the ICU staff's individual and collaborative construction of a shared understanding. The ICU staff cannot manage to produce intensive care without the technological tools, nor are the tools

themselves of interest. It is the interaction/communication within the system/unit that is focused on in the present study.

The aim was to explore how technology intervenes and challenges the ICU staff's knowing in practice. The empirical observations used in the study are taken from fieldwork documented in field notes encompassing technology intervening, disrupting and challenging routine work. Here, such situations are called routine problems, which mean situations where everyday practice becomes disrupted and staff members in the ICU do not know exactly what to do. The excerpts used in the present study have been chosen because they illuminate different problems, different (dis)solutions to the problem and different staff members' collaboration with each other and the technological tools.

The results revealed firstly that technology intervened in the division of labour prior to the registered nurses starting their morning work. Usually, it was the principle of continuity that structured the registered nurses division of labour but this particular morning a physician had prescribed that one of the patients should be treated with the new dialysis machine, the Ruby. The problem was that only one registered nurse on each shift had learnt how to handle the machine and the registered nurse responsible for the patient could not handle the Ruby. There were four registered nurses who agreed that this was a problem that had to be dealt with. It was taken for granted that knowing how to operate the machine was more important than knowing the patient. Thus it could be argued that technology preceded the patient, but on the other hand, the handling of the dialysis machine was essential for the care of the patient and for his safety. It could also be said the machine was an extension of the patient's body, as it was his artificial kidney.

Secondly, the results showed that technology challenged the staff's knowing in practice when the above-mentioned dialysis machine did not "see" the same thing as the enrolled nurse and the registered nurse taking care of the patient. To solve the problem, the registered nurse responsible communicated with the enrolled nurse and they both agreed that there probably was blood in the urinary container. The registered nurse then discussed the problem with another registered nurse who also knew how to handle the Ruby, but the latter said they did not have to bother as the machine did not display blood. The first-mentioned registered nurse was not satisfied with that answer and she turned to the "old" and less complex technological tool, the urinary stitch, which confirmed her suspicion; there was blood in the urine. The

registered nurse informed the anaesthetist, who, in turn, called for the renal physician. With the problem being (re)presented several times to different domains and juxtaposed on human communication, we can see more or less complex tools in action.

Thirdly, the results illustrated how technology reformulated practice when a physician was going to document a patient in the computer-based ICU register as well as the fact that registered nurses and physicians' work sometimes overlapped. The physician had forgotten how to enter the documentation and the registered nurse helped him with this. The problem was: was the patient being treated as a postoperative patient or was he an intensive care patient? How to categorise the patient is not a problem for physicians in everyday practice; it becomes a problem when everyday work has to be reformulated as a formal tool. This formal tool is a form of institutional memory that vouches for continuity as well as being used to describe and plan intensive care.

It is argued that technological tools can be described as actors in the ICU since they intervene and challenge knowing in practice. Often, it is taken for granted that everyday work should continue as usual even when a new tool is introduced. There was only one registered nurse who could handle the Ruby, which made the division of labour less flexible. On the other hand, the registered nurses did manage to jointly solve the problem. The conclusion here is that the ICU staff mostly solve or dissolve routine problems in concert and not solely through individual cognitive work. They rely on their cultural knowing, which helps them to see the problems and find the relevant supportive tool. In addition, they 'borrow' knowing from each other and problems are re-represented through communication.

Paper III: The meaning of technology in an intensive care unit- an interview study

The ICU involves different staff members such as enrolled nurses, registered nurses and anaesthetists. Söderberg (1999) has studied such team members' experiences of ethical dilemmas in connection to technology in the ICU. She found that the different professionals emphasise varying dilemmas when narrating their experiences. Söderberg's conclusion is that these differences can be explained by the fact that the professionals thought about different cases when describing their experiences with technology.

Other previous studies of the influences of technology in care giving have focused on registered nurses' and patients' experiences of technology within the ICU (Gjengedal, 1994; Granberg *et.al.* 1999; Norrie, 1995; Barnard, 2000). The conclusions are that technology may dehumanise the patient care in that technology restricts the nurses' focus on the patients' social needs (Gjengedal, 1994; Granberg *et.al.* 1999) and that technology restricts the registered nurses' freedom of action (Barnard, 2000; Norrie, 1995). Barnard and Sandelowski (2001) question this dualistic approach to nursing and technology and Barnard (2002) suggests a re-examination of this dichotomising between nursing and technology.

The present study can be seen as a re-examination of nurses' understanding of technology but it also explores how anaesthetists and enrolled nurses construct meaning of these tools. To our knowledge no previous study has addressed the question of how different professionals in the same ICU perceive technology. The aim of this study was therefore to explore how these staff members make sense of technology in their everyday practice.

The research questions were:

1. How do the different staff members talk about technology in their everyday work?
2. Are there any differences and/or similarities in their statements?

From a socio-cultural perspective our perception of the environment is connected to our socio-cultural experiences (Wertsch, 1998). The understanding of what we see is thus, from this perspective, connected to the knowing in practice, or to put it differently, their 'accounting practices' (Johanson, 1994; Shotter, 2000). Studies have also shown how staff members in the same institution perceive the same phenomenon in different ways due to their knowing in practice. Hence they interpret from their different positions the institutional understanding in how to make sense of their work (Cederborg, 1999; Kallmeyer, 2002; Suchman, 1997; 2000; Säljö & Bergqvist, 1997).

Data was produced through qualitative interviews with four enrolled nurses, four anaesthetists and four registered nurses.

The findings revealed that technology seemed to be decisive and that anaesthetists and registered nurses described technology as a support they trusted in their everyday practice. The physicians talked about how technology directs and controls medical treatment and registered nurses seemed to mean that technology is decisive to their assessments of the patients' medical condition. Registered nurses also said that technology could lead to the

patients' wellbeing when they talked about how the ventilators today are programmed to follow the patients' attempts to breathe. Further, they expressed that the supervision technique made the patients' stay in the ICU more comfortable. For instance, the invasive blood pressure was displayed all the time so the personnel did not have to disturb the patients to "take" the blood pressure every quarter of an hour with the "old" cuff.

Enrolled nurses as well as registered nurses expressed that technology can facilitate the treatment. Enrolled nurses stated that food pumps and patient lifts had decreased their work load as those artefacts decreased their physical work with the patients. Enrolled nurses, who had worked for more than 10 years in the ICU, also talked about how the oximetry had made their supervision of the patients more secure.

Registered nurses pointed to the dialysis machine as the overall facilitator in their everyday practice. The 'Ruby', which has replaced the peritoneal dialysis, performed much of the registered nurses' counting and changing of fluids.

In spite of being decisive and facilitating, technology also seems to have complicated the interviewees' work in the ICU in that technology has challenged the staff members' knowing in practice. The enrolled nurses seemed to be sceptical about the technology as they did not regard it as completely trustworthy in spite of them also having stated that technology made the caring more secure.

The informants also seemed to mean that technology is not easy to handle. The registered nurses told stories about situations when the dialysis machine was new. They talked about the uncertainty they felt and how worried they were that their performance would constitute a risk to the patients. Further, the anaesthetists seemed to interpret technology as a possible creator of ethical dilemmas connected to their medical decisions, which in turn seemed to complicate the registered nurses care for the patient.

The main findings seem to be that technology is a tool embedded in the everyday work in the ICU. It is in the network between people and technological tools that the tools come to life (Berg, 1997). This means an intimate relationship between people's actions and the technological tools they use (Suchman, 1997).

Further, the findings from this study indicate that the ICU staff members construct meaning of technology depending on their experience of intensive care; their accounting practices. The experiences in turn seem to be connected to how long they have worked in the ICU and to their different positions in the ICU network.

Paper IV: Morality in discourse in an intensive care unit- a field study

Technology in health care has evolved tremendously in the last decades, so also in intensive care. This in turn has made it possible to treat more seriously ill patients than before and many ICU researchers claim that this could constitute ethical dilemmas (Bunch, 2000; Söderberg, 1999). Accordingly, studies of ethical dilemmas in the ICU environment are focusing on medical decisions and end of life decisions. In the present study however, the idea is that ethical and moral questions occur not only in connection to questions of life and death, but they are also present all the time in society as well as in the everyday practice in an ICU. In this study, ethic (Greek) and moral (Latin) are seen as equal (c.f. Bergmann, 1998). Morality in this sense stands for evaluative and normative attitudes towards phenomena such as life and death, lifestyles, peoples' conduct and personalities, politics, organisations and so on (Linell & Rommetveit, 1998).

The aim of this explorative study was to illustrate how personnel, within their everyday practice at an ICU, discussed and negotiated moral values.

The theoretical starting point was socio-cultural theory, which claims that it is through communication and dialogue that people come out as moral human beings. Social conduct is thereby constituted and negotiated through dialogue when people are reasoning about what is right and wrong in the context where they act and interact. Hence morality and interaction cannot be separated from each other although it often is invisible to the interlocutors who are involved. Goffman (1990) also claims that moral issues are embedded in everyday discourse and especially in social institutions as moral values are crucial in environments of that kind. Data has been collected through field studies and has been documented in field notes. The data analysed in this study deals with staff members evaluating different phenomena in their everyday practices.

The categories found were: *assessing patients*, *assessing medical decisions*, *assessing other professionals' competence* and *assessing other institutions' activities*. When assessments of the patients were made, the patients' drinking habits were discussed in different ways. It was also found that the ICU staff rebuked each other for questioning the patients' lifestyles. There were registered nurses as well as anaesthetists who helped each other to remember the human values which intensive care should be based on.

Medical decisions were also often assessed and questioned by the registered nurses and the enrolled nurses in connection with more profound reports about the patients. The enrolled nurses and the registered nurses were not involved in medical decisions such as operations. However, they were caring for the patients post operatively and they often discussed and expressed worries about the patients' situations. Physicians could also question other physicians' decisions in discussions with registered nurses and enrolled nurses. One example was when an anaesthetist was reflecting upon a COL patient's breathing problem and he questioned other physicians' judgements.

The assessment of other professionals' competence was a frequently occurring activity in the ICU. It could be the registered nurses criticising the physicians, the anaesthetists criticising the surgeons and the day shift criticising the night shift. Further, different professionals talked about situations of discontent afterwards with other people, but they seldom directed their complaints to the criticised person in question. The moral talk also involved assessments of other institutions. For example, how the restrained budget has led to fewer operations and longer operation queues. Furthermore, the ICU staff talked about how the restrained budget jammed the health care organisation.

Morality in discourse is present in the ICU staff's everyday practices. The ICU personnel did not express explicitly that they discussed moral matters but this paper shows that moral matters were embedded in their daily communication. Everyday issues such as the patients' lifestyles, medical decisions, other professionals' doing and other institutions' activities were moralised over. Negotiations about morality were going on among the ICU staff, but seldom were the assessed persons involved in these conversations. Negotiations about moral values seem to be a continuing process and by an increased communication with those concerned the staff members can strengthen their consciousness about moral values in everyday practice. An increased awareness of unaccounted attitudes may also prevent misunderstandings of patients, but also staff members' behaviour and organisational actions.

Discussion

I wanted to understand how intensive care was produced and carried out in an ICU. The result shows that intensive care seems to be produced through routines, problem solving, meaning making and negotiations of moral values. Conclusions that will be discussed are:

The ICU staff understand intensive care from accounting practices

Technology transforms the ICU staff's everyday practice

The ICU staff negotiate meaning and moral values in everyday practice

The ICU staff understand intensive care from accounting practices

In the ICU, the everyday work leans on the routine work that competent actors carry out. In the first study we can see how one of the routines, the delivery and reception of a patient coming from the operation unit, incorporated the ICU staff's reciprocally organised work supported by the technological tools. In this sense intensive care is produced by the ICU staff members' collaboration and shared understanding of the situation in which they take part (c.f. Suchman, 1997; Godwin & Godwin, 1998). Words often seem redundant and many caring activities are taken for granted. Staff members step in and help each other in different situations. Hak (1999) found that nurses in an ICU often assisted other nurses without having been asked to do so. The 'seeing' is connected to their knowing. The everyday practice in the ICU includes such mutual helping actions between staff members. When problems appear, staff members solve them together. Enrolled nurses turn to enrolled nurses if the problem belongs to their working domain otherwise they turn to the registered nurse. Registered nurses turn to each other before they call for the physician. In Suchmans (1998) words, they are 'in it together'. I would say in line with Hak (1999) that these types of actions seldom are marked or reported in health care studies. Their competence, or as I call it, knowing in practice could also be described in the words of accounting practices; it is the knowing that has been developed over time within the ICU institution (c.f. Shotter, 2000). Accounting practices are socially shaped by the staff members in their interaction with each other and "with a world of historically constituted artefacts" (Goodwin & Goodwin, 1998, p. 70).

However, there is no fixed agenda with rules and procedures that guide the routine work; rather, it is the interaction and sense making among the ICU staff that shape the situated activities at hand (c.f. Hagstrom, 2001). The technological tools in turn can be seen as delegates for human activities or can be described as the staff members' extended arm and/or mind (c.f. Bosque, 1995; Säljö, 2000). Technological tools such as the dialysis machine carry out activities that the registered nurses carried out before the machine entered the ICU, for example changing bottles with dialysis fluid and counting how much fluid goes in and out. Technology can also be seen as the patients extended body in that the ventilator acts as the patients' lungs and the dialysis machine as the patients' kidneys. In this sense I would say that technology is incorporated in the care of the patient and not an opposite to care like many ICU researchers claim (Gjengedal, 1994; Söderberg, 1999; Barnard, 2000). However, Barnard together with Sandelowski (2001) and Barnard (2002) emphasize that a re-examination of the meaning of technology is needed and I consider this thesis a contribution to that re-examination. Technology also produces information about the patients' physical condition all the time, which skilled personnel have to interpret and combine. Technological tools cannot communicate with each other, it is the physicians, enrolled nurses and registered nurses who monitor the displays and communicate their interpretations of the information displayed to each other (c.f. Berg, 1997; Berg & Harterink, 2004).

The interpretations of the everyday practice may differ between the different staff members depending on their education, experiences from the ICU field and position in the ICU network; their accounting practices. It is also shown that the division of labour was marked, and according to Hutchins (1998), this often is the case in technologically complex workplaces. The health care institution has from a historical perspective also been characterized as a place of specialisation and hierarchical structures, something which also could be discerned in the ICU. The physicians attend to the patients' medical problems and to the programming of the technological equipment and when they have carried out their responsibilities they leave the patient room, and at times even the ICU, to attend to other tasks. Hak (1999) aimed to study how anaesthetists delivered bad or good news in an ICU when he after some days found that when the anaesthetist had performed the morning round he disappeared from the ICU. It then was the nurses who carried out the ongoing work with the patients which also were the case in my study. The enrolled nurses were the ones who never left the patient room and they were monitoring the patients and the monitors and

reported to the registered nurses. They also carried out washing and other forms of body care, sometimes together with the registered nurses. Registered nurses also had the overall responsibility for the care of the patients and they came and went to the patient room carrying out different caring activities. However, they never left the ICU without telling the enrolled nurse where they were going.

In the interview study the different staff members referred to technology they were handling in their different tasks. Enrolled nurses, registered nurses and anaesthetists seemed to perceive the meaning of technology from their different positions in the network; they made meaning of technology from their different accounting practices, which in turn were connected to their participation in institutional practices. It is the way people are making sense and are reasoning in situated actions (c.f. Shotter, 2000) which can be confusing to newcomers in the ICU, but as time goes by routines become invisible to the competent actor. And accounting practices is what newcomers have to learn from their more experienced colleagues as a pre-understood taken for granted knowing in practice (c.f. Shotter, 2000).

Technology transforms the ICU staff's everyday practice

The production of intensive care also depends on technology to a great extent. Often it seemed as if new technology was expected to fit into the environment without causing disruptions. Technology was merely an object to be used, as when the new dialysis machine called 'the Ruby' entered the ICU. However, it seems as if technology transforms practice in that this machine caused problems that the registered nurses had to solve. The dialysis machine challenged the ICU staff's knowing in practice when 'the Ruby' violated the everyday routines taken for granted intervening in the registered nurse's division of labour in the morning. The principle of continuity was interrupted as the acquaintance with the Ruby appeared to be more important than the acquaintance with the patient. On the other hand, it was the safety work that was put in the forefront (c.f. Thelander, 2000). The ICU staff expressed an ambiguity towards the technology that surrounded them. On one hand, they talked about technology as decisive, and on the other hand, they said that technology complicated the everyday practices and also created moral dilemmas (c.f. Söderberg, 1999; Svantesson, Sjökvist & Thorsén, 2003). Further Darbyshire (2004) found ambiguity to technology in that the nurses' experiences of computerized patient information systems were

‘characterized by digital disappointments rather than electronic efficiencies’ (Derbyshire, 2004, p. 17). One of the problems was that the professionals tried to make a complex everyday practice to fit into the digital system.

In complex technological environments such as the ICU, practices are transformed when new technologies are introduced. Suchman (1997) claims that the impression of a new tool changes as staff members work with it. The division of labour is changed, staff members have to be trained to handle new machines and at times it takes more people to monitor a new machine. Technology transforms the knowing in practice, such as “seeing” whether the patient is well saturated with oxygen or seeing if there is blood in the urinary bag in spite of the dialysis machine not displaying that. Staff members do not have to touch the human body to count the pulse rate; the oscilloscope displays pulse rate and blood pressure among other graphic visualisations. The injections pump and the dialysis machine do the work that the registered nurses used to do before.

From a historical perspective, it seems to be as when the stethoscope was first invented and used. The physician did not have to put his ear to the patient’s chest to listen to the heart beat, he had the stethoscope between them; and when the X-ray was introduced, inner organs could be examined without the patient present (Berg & Harterink, 2004; Wackers, 1993). It seems as if technology moves the professionals further from the patients. When practice is transformed, the ICU staff have to learn new things and there is a risk that the ‘old’ knowing in practice disappears. Within health care we talk about the ‘clinical gaze’, which is an expression for knowing in practice, i.e. competence. The seeing is connected to our cultural, contextual seeing and when the context changes the seeing has to change as well. There is a risk that the ‘clinical seeing’ focuses on the displays more often than on the patient as the patients’ physiological condition is displayed in the oscilloscope. To actually see what is going on is connected to knowing in practice or the cultural competence to read a scene (Suchman, 1997; Goodwin & Goodwin, 1998). Knowing is tied to the context, and is from that perspective a social phenomenon (Goodwin & Goodwin, 1998), which also the third study reveals.

The ICU staff negotiate meaning and moral values in everyday practice

There are other studies within the ICU context which have focused on ethical and moral issues in connection to life supporting decisions or end-of-life decisions (Bunch, 2000; Svantesson, Sjökvist & Thorsén, 2003). However, my findings reveal that meaning and moral values constantly are discussed and negotiated in the ICU even if the interlocutors are not aware of it. The ICU staffs also seem to negotiate meaning and morality in concert (c.f. Hutchins, 1990). ICU staff members express judgements about patients, other health care workers and institutions without explicitly saying that they are evaluating them. This is shown in the fourth study when the categorization of the patients in the report which usually points out the patients' diagnosis suddenly is changed to the patients' behaviour. From a socio-cultural perspective talk is always ideological, i.e. moral (c.f. Mäkitalo, 2002). Morality is embedded in the everyday activities in the ICU and Bergmann (1998) states that it is in social interaction that moral issues are handled.

The ambiguity towards technology which can be seen in the third paper can also be interpreted as the ICU staff taking moral stances when they talk about safety and risk (c.f. Thelander, 2001). To be a competent member in the ICU staff seems to include acting in a safe manner and being aware of risks. Further, acting in a safe manner seems essential when relatives are present. In institutional settings as the ICU it is crucial for the staff members to appear secure to 'the public' which also includes moral values and face-holding (c.f. Goffman, 1990). Everyday activities are not only contextual, they are also normative and it is through discourse people learn how to be responsible actors, i.e. learn their accounting practices. That moral issues are embedded in the everyday practice in the ICU is focused on in paper number four, but there were situations in the other papers that also could be interpreted as if moral values were at stake. The development of technology makes it possible to treat more complex medical problems than before in health care and this can create moral dilemmas to the health care personnel and maybe especially for the ICU staff members. The registered nurses and the enrolled nurses in the study took care of patients who had been treated with the new technologies. Old patients were operated on and the staff questioned those treatments and said "is this right"?

Utterances of victim blaming (c.f. Crawford, 1980; Greco, 1993) also occurred but they were often mitigated by other ICU staff members. ICU staff members helped each other to remember the moral values which health care should be based on. It is also shown how personnel were engaged in discussions and assessments about situations they were not participating in. Further, it was not unusual for the enrolled nurses and registered nurses to criticize matters they were not responsible for (c.f. Goodwin, 2005). The discussions and negotiations about moral values mostly were going on between registered nurses and enrolled nurses in the ICU. This was especially marked when the afternoon shift got the more profound report about the patients. Those situations often involved discussions about patients and their relatives and decisions that different physicians had made. Registered nurses said that they were not involved in medical decisions and that they sometimes did not understand how the physicians were reasoning. On the other hand, registered nurses seldom questioned the physicians' decisions overtly.

However, the physicians also criticized colleagues silently and mostly it was too much treatment that was focused on (c.f. Söderberg, 1999). The staff members also discussed their experiences with others, who often understood and agreed with them. Thelander (2001) also discusses how ICU staff members handle criticism towards each other. She found that it is easier and even okay to criticize staff members that are lower in range, but rarely they criticize physicians as the health care system still is predominantly hierarchic (c.f. Goodwin et.al., 2005). To criticize the night shift, politicians or other institutions can be interpreted as a way of creating a 'feeling of inclusion' by shaping boundaries against others (c.f. Goffman, 1990). Further, the ICU staff almost every day discussed how the patients were squeezed in the system, which can be understood in the light of modern societies having undergone a development towards rationalisation. Rationalisations in turn may influence how moral values seem irrelevant to the bureaucratic system (Bergman, 1998). However, the health care workers have a commitment to care for patients and to preserve and maintain moral values, something which also has been shown throughout the four studies.

Conclusion

The main conclusion drawn from these four studies is that the ICU staff's competence i.e. knowing in practice as situated activities is a tool for the production of intensive care. The

knowing is distributed between the humans and the technological tools and the ICU staff think together with each other and the technological tools or artefacts through communication. Staff members 'borrow' knowing from each other as it is not only individual knowing that is needed to carry out intensive care.

Intensive care is produced here and now at the same time as the past is present in the everyday practices. Activities are shaped and re-shaped through communication and new technology shapes new activities, at the same time as humans develop and construe new technology. Past communication and activities are visible in the everyday work at the same time as we know that the present will change in the future which in turn change the knowing in practice. The heritage of knowledge is important for the understanding of the present and the discussions and negotiations is thus a never ending story. In the ICU, everyday practices are tied to the technological tools and those practices are to a great extent built on communication. Humans and tools are thus interwoven. In this sense, it seems that technology is a tool embedded in the caring of the patients rather than being an opposite to care. However, technology is also seen as an actor and in that sense technology transforms the ICU staff's competence, or as I prefer to call, it knowing in practice. Most of the monitoring today is done through digital equipment, which displays the information. However, the interpretation and combining of information has to be done by the ICU staff. Knowing in practice is transformed to encompass monitoring the monitors, looking for changes, reporting changes, put information together and documenting everything in the different records. Problems are solved in concert but often in a hierarchical way.

Further, meaning is shaped in context; the ICU staff create meaning from their accounting practices and they seem to understand intensive care from their different perspectives of what intensive care is about. The construction of meaning is thus dependent on education and experiences. The registered nurses and the anaesthetists have formal education in intensive care, whereas enrolled nurses have learned to be enrolled nurses through participating in the everyday practices together with more experienced enrolled nurses as well as with anaesthetists and registered nurses.

It can also be concluded that issues of a moral character always are at stake as discourse inherently is ideological. Accordingly, I would say that the ICU is a technically, cognitively and morally intense environment, which shows how complex the intensive care practices are.

An important realization from this thesis is that these complexities must be included in the education for health care personnel. There also seems to be a need for developing fora where enrolled nurses, anaesthetists and registered nurses can discuss the everyday work to improve their understanding for each other's commitments. It is not only the individual competence, i.e. knowing in practice that produces intensive care. Rather, it is in the network of human knowing, individual as well as collective, and the human knowing transferred to technology that intensive care is produced.

Further studies

It would be interesting to study the ICU staff's interaction with the patients and the relatives in a more profound way as this thesis has not focused on that issue. Another situation in the ICU which would be of interest to explore is when the reports are given as a new shift begins in the afternoon. What and how do they report to each other? The interaction between health care personnel and technology within other health care contexts could be the focus of another study. Further it would be interesting to study how registered nurses and enrolled nurses in primary health care who care for the patients in the patients' own homes interact with each other and the technological tool as a great deal of health care has been transferred to the patients home.

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Bilaga 1

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19980812

KOMMUNIKATION OCH TEKNOLOGI- en studie av kommunikation i en teknologisk miljö inom hälso- och sjukvården.

Information till personal inom intensivvård

Det övergripande syftet med studien är att synliggöra hur arbetet på en intensivvårdsavdelning går till. En stor del av arbetet består av kommunikation vilket innebär att samspel och samtal inom personalgruppen och mellan personal, patienter och anhöriga samt samspelet mellan personal och teknik kommer att vara i centrum.

Projektet är förankrat hos klinikchef Lars Spetz, för intensivvårdsavdelningen medicinskt ansvarig överläkare, Örjan Lennander, samt hos avdelningschef Ulla Lennander.

Ann-Charlott Wikström, som skall genomföra projektet är leg. sjuksköterska, lärare på Hälsö högskolan Väst i Vänersborg, och doktorand på Vårdlärarinstitutionen, Göteborgs Universitet. Studien skall leda fram till en doktorsavhandling inom ämnet vårdpedagogik.

Studien bygger på observationer av arbetet inom intensivvårdsmiljön. Detta betyder att forskaren befinner sig på intensivvårdsavdelningen för att följa det dagliga arbetet under längre sammanhängande perioder, men deltar inte i det direkta vårdarbetet. För att få en djupare förståelse för skeenden i vårdverksamheten kommer intervjuer att göras med vissa befattningshavare. Av speciellt intresse är hur personal av olika kategorier samspelar med varandra och med tekniken. Andra situationer som studien har i fokus är mottagande av patient, arbetets organisering, olika befattningshavares ansvarsområden och göromål, etiska dilemma och rapportering, dokumentation och ronder, samt samspel mellan personal och patienter/anhöriga. Således är studiens fokus personalens aktiviteter. I samband med observationerna kommer fältanteckningar att föras och vid vissa situationer, som vid rapportering och ronder, kan ljudbandinspelningar förekomma. Informerat samtycke kommer att inhämtas av personalen med beaktande av anonymitet och konfidentialitet och frivillighet.

Vård- och behandlingsarbetet kommer att följas under avgränsade tidsperioder. En vecka följs f.m. arbetet, nästa vecka e.m. arbetet och senare kvällsarbetet, såväl vardags som helgskift.

Vetenskapliga handledare är Docent Ullabeth Sätterlund Larsson tillika forskningsledare vid Centrum för forskning och utveckling, Hälsohögskolan Väst i Vänersborg. Medhandledare är Professor Roger Säljö, Pedagogiska Institutionen, Göteborgs Universitet.

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KOMMUNIKATION OCH TEKNOLOGI- en studie av kommunikation i en teknologisk miljö inom hälso- och sjukvården.

Information till fackliga företrädare

Det övergripande syftet med studien är att studera hur arbetet på en intensivvårdsavdelning går till. En stor del av arbetet består av kommunikation vilket innebär att samspel och samtal inom personalgruppen och mellan personal, patienter och anhöriga samt samspelet mellan personal och teknik kommer att vara i centrum.

Projektet är förankrat hos klinikchef Lars Spetz, för intensivvårdsavdelningen medicinskt ansvarig överläkare, Örjan Lennander, samt hos avdelningschef Ulla Lennander.

Ann-Charlott Wikström, som skall genomföra projektet är leg. sjuksköterska, lärare på Hälsö högskolan Väst i Vänersborg, och doktorand på Vårdlärarinstitutionen, Göteborgs Universitet. Studien skall leda fram till en doktorsavhandling inom ämnet vårdpedagogik.

Studien bygger på observationer av arbetet inom intensivvårdsmiljön. Detta betyder att forskaren befinner sig på intensivvårdsavdelningen för att följa det dagliga arbetet under längre sammanhängande perioder, men deltar inte i det direkta vårdarbetet. För att få en djupare förståelse för skeenden i vårdverksamheten kommer intervjuer att göras med vissa befattningshavare. Av speciellt intresse är hur personal av olika kategorier samspelar med varandra och med tekniken. Andra situationer som studien har i fokus är mottagande av patient, arbetets organisering, olika befattningshavares ansvarsområden och göromål, etiska dilemma och rapportering, dokumentation och ronder, samt samspel mellan personal och patienter/anhöriga. Således är studiens fokus personalens aktiviteter. I samband med observationerna kommer fältanteckningar att föras och vid vissa situationer, som vid rapportering och ronder, kan ljudbandinspelningar förekomma. Informerat samtycke kommer att inhämtas av personalen med beaktande av anonymitet och konfidentialitet och frivillighet.

Vård- och behandlingsarbetet kommer att följas under avgränsade tidsperioder. En vecka följs f.m. arbetet, nästa vecka e.m. arbetet och senare kvällsarbetet, såväl vardags som helgskift.

Vetenskapliga handledare är Docent Ullabeth Sätterlund Larsson tillika forskningsledare vid Centrum för forskning och utveckling, Hälsohögskolan Väst i Vänersborg. Medhandledare är Professor Roger Säljö, Pedagogiska Institutionen, Göteborgs Universitet.

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KOMMUNIKATION OCH TEKNOLOGI- en studie av kommunikation i en teknologisk miljö inom hälso- och sjukvården.

Information till patienter och anhöriga

På intensivvårdsavdelningen pågår en studie vars övergripande syfte är att studera hur arbetet på en intensivvårdsavdelning går till. En stor del av arbetet består av kommunikation, vilket innebär att samspel och samtal inom personalgruppen och mellan personal, patienter och anhöriga är i centrum. Projektet är förankrat hos klinikchef Lars Spetz och för intensivvårdsavdelningen medicinskt ansvarig överläkare, Örjan Lennander, samt hos avdelningschef Ulla Lennander.

Ann-Charlott Wikström, som skall genomföra studien är leg. sjuksköterska, lärare på Hälsö högskolan Väst i Vänersborg, samt är doktorand på Vårdlära rinstitutionen, Göteborgs Universitet. Studien skall leda fram till en doktorsavhandling inom ämnet vårdpedagogik.

Studien bygger på observationer av arbetet inom intensivvårdsmiljön, vilket betyder att forskaren befinner sig på intensivvårdsavdelningen för att följa det dagliga arbetet under längre sammanhängande tidsperioder. Intresset är inriktat på personalens vård och behandlingsarbete, inte på enskilda patienter och anhöriga. Av speciellt intresse är hur personal av olika kategorier samspelar med varandra och med tekniken. Andra situationer som studeras är mottagande av patient, arbetets organisering, olika befattningshavares ansvarsområden och göromål, hur man lär sig ny apparatur samt hur ronder, rapportering och dokumentation går till. I samband med observationerna kommer fältanteckningar att föras och vid vissa situationer, som vid rapportering och ronder, kan ljudbandinspelningar förekomma. Anonymitet, konfidentialitet och sekretess beaktas självklart i nämnda studie oeg deltagandet är frivilligt. Ingen enskild patient eller anhörig kan identifieras i den kommande rapporten.

Vetenskapliga handledare är Docent Ullabeth Sätterlund Larsson tillika forskningsledare vid Centrum för forskning och utveckling, Hälsohögskolan Väst i Vänersborg. Medhandledare är Professor Roger Säljö, Pedagogiska Institutionen, Göteborgs Universitet.

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PART B

Papers I- IV

I

Patient on display – a study of everyday practice in intensive care

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WIKSTRÖM A.-C. & SÄTTERLUND LARSSON U. (2003) *Journal of Advanced Nursing* 43(4), 376–383

Patient on display – a study of everyday practice in intensive care

Background. This study investigates the situated organization in a workplace producing intensive care, that is an intensive care unit (ICU). The workplace research tradition concerns work and interaction/communication in technology-intensive environments. Communication is seen as social action and cannot be separated from production or from the context in which the activities are situated. **Aim.** The aim of the present study was to explore how intensive care is produced by analysing a recurrent situated activity in the ICU, namely the delivery and reception of a patient coming from the operation unit.

Method. In the fieldwork, participant observations was used to study everyday practice in an ICU, combined with written field notes.

Findings and discussion. Intensive care is to a great extent produced through routine practices. The division of labour is marked and is taken for granted: everyone knows what to do. The actors' physical location in the room is connected to their functions and work with supportive tools. Verbal reports, visual displays and activities make the information transmission available to everyone in the patient room. Shared understanding of the situation seems to make words redundant when the activities of competent actors are co-ordinated. There is also coordination between the actors in the ICU and the technological equipment, which constantly produces new information that must be interpreted. Enrolled Nurses are physically closest to the patients, the physician is the one most physically distant from patients and Registered Nurses bridge the gap between them. These actors produce and re-produce intensive care through constant sense-making in the here and now at the same time as the past is present in their activities.

Keywords: human technology, communication, routine practice, intensive care, participant observation, nursing

Introduction

This study was an investigation of the situated activity in a workplace that produces intensive care, the intensive care unit (ICU) in a medium-sized hospital in Sweden. In recent decades, the technology of health care delivery in general has

advanced tremendously, and that of the ICU in particular. The origin of ICUs today can be found in the evolution of new technology developed after the Second World War. In the Northern countries, particularly in Sweden and Denmark, technology developed at a rapid pace at the beginning of 1950s because of the poliomyelitis epidemic, which was

followed by a marked increase in the development of ventilators for treating patients suffering from respiration insufficiency (Wackers 1993). The ventilator was described by the Norwegian researcher Gjengedal (1994, p. 28) 'as one of the major lifesaving technologies relied on in the ICU'. When one enters an ICU, technology dominates the environment, and a vast array of machinery is visible. Patients in ICUs are connected to monitors for electrocardiograms (ECG), and electronic readouts of heart rate, and invasive blood pressure, oxygen saturation and central venous pressure (CVP) recordings. Almost all the technological equipment used in ICUs today is digital and computers make it possible continuously to monitor patients' internal physiology (Reiser 1978). The human body does not even have to be touched to determine the heart rate and, as Bosque (1995) puts it, 'machines can become an extension of a person and can result in a type of symbiotic relationship' (p. 73). Most studies of ICU settings focus on the impact the technology has on patients or individuals working there (Ashworth 1990, Söderberg 1993, Gjengedal 1994, Granberg *et al.* 1999) and others, such as Bosque (1995), focus on how various machines work. Rather than talking about the impact that technology has on human beings, we prefer to talk about interaction between humans as well as human-machine interaction and communication (Suchman 1987).

The workplace research tradition

This study in the area of the ICU draws on workplace research tradition in line with the work of Suchman (1987, 1997, 1998, as well as that of Heath and Luff (2000), who states that workplace studies are 'concerned with work, technology and interaction' (p. 17) in technologically intense environments like ICUs. According to workplace research tradition, communication is seen as social action, i.e. communication and production cannot be separated or, to put it differently, talk is action (Suchman 1997). Furthermore, Suchman claims that activities are always situated in a context and can only be understood in that particular context or environment. This means that fieldwork or *in situ* studies can be one way of developing knowledge about collaborative work in technologically intense environments (Hutchins 1990, Heath & Luff 1992, 2000, Suchman 1997). The situated activities analysed in workplace studies are often encapsulated in very brief excerpts from field notes or video recordings, but those excerpts are scrutinized in a moment-by-moment examination (Suchman 1998). Studies of communication as action in technological environments focus on fields such as aircraft operation rooms (Suchman 1997, 1998, Goodwin & Goodwin 1998), team navigation (Hutchins

1990, Hutchins & Klausen 1998) and underground line control rooms (Heath & Luff 2000). There is a growing body of studies on workplaces, but very little on a workplace like an ICU. Accordingly, we wanted to illuminate the relationship between the social and technical sides in an ICU setting. To quote Suchman (1997, p. 57): 'there is every indication that comparative analysis across such sites would more than repay our efforts'.

The study

Aim

The aim of this study was to explore how intensive care is produced by analysing a recurrent situated activity in ICUs, such as the delivery and reception of a patient coming from the operation unit.

Setting and participants

The study was conducted in an ICU in a medium-sized hospital in the west of Sweden. The most common reason for being an ICU-patient is respiratory insufficiency. The ICU in this hospital is the only unit that can offer respiratory treatment. Most patients in ICU settings are unconscious and therefore it was not possible to ask for their consent. However, it should be emphasized that the study focused on staff and not patients. Nor did it focus on individual staff members, but rather on communication and interaction. The participants were Registered Nurses (RNs), Enrolled Nurses (ENs) and physicians, but also patients and their relatives were observed as the study focused on interaction in the everyday work in the ICU.

The health care staff were assured that consent and confidentiality would be maintained.

Data collection

The study was based on empirical data produced through participant observations documented in field notes. Agar (1980) describes observation studies as 'field work', which always means long-term contact with a group of people in their own environment. The goal of field work is to understand participants' activities in everyday practices (Agar 1980). Furthermore, in their study of collaboration and control in underground lines in London, Heath and Luff (1992) emphasized the need for research on co-operative work in technological settings *in situ* (Heath & Luff 2000, p. 8) or naturalistic studies, which means those conducted outside laboratories. As our study focused on everyday work,

the observations were carried out in conjunction with everyday practices in the ICU. This involved observations of work in patient rooms, when patients arrived at the ICU, when RNs and ENs were caring for patients and in conjunction with medical treatment, with a focus on what people did or said. The data were collected in the autumn of 1998, in the spring and autumn of 1999 and in spring, 2000. Observations were documented in field notes written at the time of or shortly after the observations.

Ethical considerations

The Research Ethics Committee of the Medical Faculty, Gothenburg University (L 285-98) approved the study.

Analysis

The manually written field notes were transcribed verbatim and their analysis was based on the general question 'How is intensive care produced?' The unit of analysis was situated activities where staff members interacted with each other and with the machines around the patients. It is, as Heath and Luff (1992, p.70) put it, 'the interaction between different personnel as they co-ordinate a range of tasks and utilize various tools' that is focused on in the analysis. Field notes were read and reread to allow the data to 'talk'. Questions such as 'Who did the talking?', 'What did they talk about?' and 'What actions did they take part in?' guided the reading (Polit & Hungler 1999). Key phrases emerging from the data were personnel interaction, human-machine interaction and what do they have to know, learning something new, metaphors, safety and trust-mistrust. These key phrases were written in the margin. The next step in the analysis involved grouping key phrases to find the patterns (Silverman 2000) that answered the question: 'What do they do when they do intensive care?'

Findings

Often, when an ICU is discussed, people tend to think of nurses and doctors running around with injections, infusions and blood and all the patients having a cardiac arrest or suffering from hypotension. However, one finding in the present study was that intensive care to a great extent is produced through quite benign situations or activities involving routine practices. Such a recurrent situated activity in the everyday work in the ICU is the delivery and reception of a patient coming from the operation unit. This delivery and reception forms a pattern where two phases are distinguishable. Phase one involves the delivery and reception of a

patient when staff from the operation unit interact with the ICU staff. Phase two involves how the routine in ICU proceeds when staff from the operation unit have left and ICU staff interact with each other, the patient and the technological tools.

Phase one

We will now take a closer look at the first episode, the delivery and receiving situation, through a moment-by-moment examination (Suchman 1998). Excerpt 1 below illustrates how the routine for delivering and receiving a patient appears in the ICU. The patient, who has been operated on for an aorta aneurysm, has returned to the ICU. He is unconscious and has been placed in a patient room. Together with the patient, there are six people (the researcher excluded) in the room.

Excerpt 1

Beside the bed, beside the patient's head, an anaesthetist, who treated the patient during the operation, is lifting away the mobile oxygen unit from the patient's bed. Opposite him, beside the patient's head another man, an ICU physician, is simultaneously connecting the ventilator to the patient. Two female ICU staff members, EN and a RN, connect the patient to the oscilloscope that monitors ECG, pulse rate, invasive blood pressure, non-invasive oxygen saturation and Central Venous Pressure (CVP). A nurse anaesthetist, who had also cared for the patient during his operation, asks: 'Who wants a report?'. 'I'll take it', an ICU RN says. The nurse anaesthetist says: 'Usual intubation anaesthesia Leptanal, he has his Salem tube in his mouth, he was bleeding from his nose'. 'I have looked down, you will have to look down before you take the tube away', the anaesthetist from the operation unit says. The nurse anaesthetist rattles off information like infusions, bleeding, drugs, blood tests, anaesthetic method and the surgical method, which, she says is a bit different than the usual one. She documents manually in the anaesthetic record while she talks. The ICU RN, who is 'taking' the report, is also standing so she can see the anaesthetic record. The nurse anaesthetist finishes with: 'He has been stable, he has behaved well'. At the same time, the ICU RN checks the infusions, and the injection needles and asks 'What do his legs look like?' and then lifts the sheet away.

Everyone knows what to do. In this case, the ICU staff know the patient as they prepared him for the operation. The patient is unconscious because of the anaesthetic drugs injected during the operation. He is unable to talk, breathe, eat or drink; his life is dependent on the actions of the health care staff. The 'delivery' includes the patient, with all his infusions, injection needles, tubes and wires, and a written as well as verbal report. For the staff members, this is an episode

consisting of routine practices and occurs at least once a week. Nevertheless, it is a complex situation and none of the staff members could have conducted it alone; neither could the situation have been handled without supportive tools (Hutchins & Klausen 1998). The delivery and reception must be carried out in a safe way. Everyone in the room knows what to do and everything is happening at the same time or, to put it differently, the division of labour is taken for granted (Suchman 1997). The staff members have a shared understanding of the situation. All of them have performed these actions before and they share the same expectations as to what is going to happen next. It is taken for granted that a specific actor will connect the patient to the oscilloscope and that the ICU RN, who was responsible for the care of the patient before the operation, is the one who 'takes' the report from the nurse anaesthetist.

Location in the room. Access to the room is connected to the specific function of each actor (Goodwin & Goodwin 1998). Staff members are also located in the room, depending on what tasks they are expected to perform. The two RNs are placed so they can look at the written anaesthesia record, the patient and all the equipment surrounding him while the verbal report is given. The two physicians' location in the room is a consequence of their responsibility for giving the patient respiratory treatment, which was performed as a joint activity. The physician who is 'delivering' the patient, disconnects the oxygen that belongs to the operation unit and simultaneously the ICU physician connects the ventilator to the patient's tracheal tube (the tracheal tube was inserted in the operation unit). The ventilator breathes for the patient but the physician has to connect the machine, in addition to deciding a range of functions on the ventilator. The actions of the physicians are shaped by the patient's need for oxygen and by the supporting technology, in this case the ventilator. The joint activities are taken for granted.

Information transition. The physicians perform their tasks without discussion until the one from the operation unit says, 'I've looked down, you will have to look down before you take the tube (tracheal tube) away'. This utterance follows directly after the utterance from the nurse anaesthetist that 'He has his Salem tube in his mouth, he was bleeding from his nose' when she is giving the report to the ICU RN. Everyone can see that the patient has his 'Salem tube' in his mouth, instead of his nose. But this is an unusual situation and is explained by the bleeding from his nose. That is why he cannot have the tube in his nose. The anaesthetist from the operation unit 'has looked down'. Nobody asks what he

meant by that utterance. Everyone knows that he has looked down the patient's throat to check if it still is bleeding. The ICU RN inspects the equipment, infusions and bandage to get a picture of the patient's current condition. When she asks, 'What do his legs look like?', she lifts the sheet and looks at the bandage and the patient's legs. There is no verbal answer to that question – she is responding to the question herself by looking at the legs. All the recordings, such as blood pressure and heart rate, are visible on displays to everyone in the room. Verbal reports, visual displays and activities make the transmission of information available to everyone in the room. Technology mediates the patient's physiological state, which is communicated to staff members. The human body is in some way the human individual; as the nurse anaesthetist said about the unconscious patient during the operation: 'He has behaved well'. Thelander (2001, p. 69) describes this in her study of intensive care. An anaesthetic physician gives a report to ICU staff, saying 'We have not had any problem whatsoever' (our translation). The patients' measurable physiology had behaved as was expected.

Patient on record. The actions around the patient are continued when the EN raises a question about where the ICU record is.

Excerpt 2

The nurse anaesthetist says that she has left the record in the operation unit and that she is going to fetch it there. The nurse anaesthetist leaves the room. When she returns, the EN gets the ICU record and starts to monitor the displays and document the figures in the ICU record.

It is a rule that as soon as a patient arrives at the ICU, the EN or RN starts to document information in the ICU record. In this ICU record, which is in paper form, staff members write down the numbers that the machines display, all drugs given, infusions, urinary output and tests that must be or have been taken. The document is used to provide physicians or other nurses with a report on the patient's condition over a period of 24 hours. This record can be moved from the patient room and is like a 'chart' of the patient's condition. Latour (1986) says that written documents or 'inscriptions' should be 'mobile, presentable and readable' (p. 7). The ICU record is an institutional document, a form of memory, a report, and, in spite of the complex technology in the ICU, papers and pen are still used to co-ordinate everyday activities.

Shared understanding. Back in the patient room, the routine is still in progress when the patient starts to move restlessly.

Excerpt 3

The ICU RN asks: 'Can I give him something?' 'Give him (midazolam), that's what I've done' the nurse anaesthetist says and leaves the room. The patient gets an injection from the ICU RN and seems calm again.

When the patient starts to move restlessly, the ICU nurse interprets this to mean that he is 'on his way up', an expression often used in the ICU, from unconsciousness. The nurse anaesthetist has injected drugs such as midazolam into the patient's vein during the operation to make him sleep and now the drug is no longer effective. Without any discussion, the ICU RN and nurse anaesthetist tend to take it for granted that the patient needs something to sedating him. They both know that he is not supposed to wake up yet and they interpret his movement as indicating that he is not feeling well. But there is no discussion about an alternative interpretation. The two RNs share the same interpretation (Suchman 1997). As the physician has left the room, the ICU RN turns to the nurse anaesthetist. When the nurse anaesthetist leaves the room, the delivery phase is over and phase two starts.

Phase two

The EN is monitoring the patient and the displays on the machines and writing down the numbers in the ICU record. She is also checking the temperature of the patient's feet with her hands when she turns to the RN with a question:

Excerpt 4

Is there any place to feel, the feet are a bit cold', the Enrolled Nurse says.

Competent actors. Enrolled Nurses routinely check the temperature of patients' feet after an aneurysm operation, just as the EN in this situation does. She checks the temperature by touching the patient's feet with her hands. She knows that the feet should be warm or, rather, they must not be cold. Now, she says that the feet are 'a bit cold', which is not to say that the patient is freezing. Cold feet could indicate that the circulation in the feet is insufficient, which would be an unwelcome complication. In order to check the circulation, the EN has to check the artery pulsation in the feet. The ECG shown on the oscilloscope display and the arterial blood pressure cannot inform the staff about the peripheral circulation in the patient's feet. In spite of technology, the pulse in the feet has to be 'taken' manually. The EN heard the nurse anaesthetist's report to the intensive care RN and she understood that the operation method used this time was

somewhat unusual (Heath & Luff 2000). This information confuses her, because otherwise she would have known where to take the pulse. The two ICU RNs who are in the patient room immediately start to read the documents from the operation and discuss the surgical method in order to find an answer to the EN's question. They use each other and technological tools, in this case the anaesthetic record (Goodwin & Goodwin 1998). The RN who is responsible for the care of the patient explains the operation method and shows that the pulse can be taken on the foot as usual. After this discussion, the RN in charge turns to the other nurse present and says:

Excerpt 5

'Could we get a doctor, I haven't got any prescriptions?' The RN walks away.

Although the RN who is responsible for the care of the patient uses the expression *we*, her colleague immediately leaves the room to fetch a physician. The use of *we* seems to be a tentative way of giving an order, because there was no discussion about who was going to fetch a physician. Alternatively, the use of *we* in this situated activity can be interpreted as an expression of the RNs institutional identity: she talks about *we* in this room who are representatives of the institution (Sätterlund Larsson 1989, Mäkitalo 2001). But it could also be a routine matter, one that is taken for granted. This could be explained by the organization of work in the ICU. It was mentioned earlier that the ICU nurse who was responsible for the patient before the operation was also the one who received him and 'took' the report. The other ICU nurse in the patient room was 'unattached', which means that she did not 'have' a patient of her own; she was assisting the 'responsible' nurse and she also used her knowledge about how 'it usually is'.

Information interpretation. Back in the patient room, the RN who walked away returns with two physicians. The physicians enter an ongoing situation and they monitor the displays and the ICU record to inform themselves of the patient's condition or, as Suchman (1997, p. 47) puts it, they are 'reading a scene'.

Excerpt 6

One of them says: 'He has ten in CVP'. The physician pointed at the display indicating 10. The other physician says: 'And the pressure is?' 'The pulse is good', the Enrolled Nurse reports.

The graphs and numbers are pictures of what is happening in the patient's body. All the information, like the ICU

record, numbers and graphs, can be combined. But the machines can only give a picture – they cannot interpret what the graphs and numbers mean. It is up to the staff members to combine and interpret the information and what should be carried out with it subsequently. When the physicians focus their attention on the numbers on the displays, the EN says, ‘The pulse is good’, What did she mean by that? It is not the pulse rate or the rhythm, because they are displayed. What she told the physicians is that the circulation in the patient’s feet is good – she has felt that with her hands.

Discussion

The aim of this study was to explore how intensive care is produced by analysing a recurrent situated activity in the ICU. This was done by means of fieldwork or *in situ* studies of everyday practice in an ICU, combined with written field notes (Hutchins 1990, Heath & Luff 1992, 2000, Suchman 1997). We claim that intensive care to a great extent is produced through routine practices. Hagstrom (2001, p. 145) writes that routine practices ‘are the ways we go about the countless intricacies of moving through daily activities in a socially shared world’. In the receiving situation analysed here, division of labour is marked and taken for granted: everyone knows what to do (Suchman 1997). The actors’ location in the room is connected to their functions and work with supportive tools, or to ‘both supportive tools and specific situated work with those tools’, as Goodwin and Goodwin (1998, p. 64) put it. Verbal reports make the transmission of information available to everyone in the patient room, and additional information about the patient is documented in the ICU record. The production of intensive care is a matter of life and death for the critically ill patient. The ICU physician takes over the responsibility for the patient’s breathing and oxygen needs by connecting the ventilator and also decides what and which of the ventilator’s functions should be used in this specific case. When the ICU physician has finished, he leaves the room. It is also taken for granted that the ‘responsible’ ICU RN ‘takes’ the report, and the verbal report seems almost physical, just like the written report. Everyone in the room overhears the verbal report – the transmission of information – and the physician from the operation unit interjects and says that he has ‘looked down’. Later, we see that the EN has understood that the operation method used was somewhat unusual. These are examples of staff members being competent actors or, as Heath and Luff (2000, p. 20) put it, they are ‘ongoingly co-ordinated to the actions of others’. When the delivery phase is over, there are two ICU RNs and one EN left in the room. The EN monitors

the displays and writes the numbers down in the ICU record, which is why she is the first to notice that there is no record. Berg (1997) calls a record a formal tool, and says that a formal tool only can ‘come to life’ by virtue of the everyday activities of personnel. The EN is the one physically closest to the patient and she is also the one person who never leaves the patient room without being replaced. The ICU RN is somewhere in between the EN and physician. Söderberg (1993) also discusses this in between position, reporting in her study of ethical difficulties in intensive care that ENs told stories related to ‘relationship ethics’ and physicians told stories related to ‘action ethics’. The RNs’ stories concerned both relationship and action ethics (Söderberg 1993, p. 2008), which indicates that the RN is bridging the gap between the physicians’ and the ENs functions. In our study, the ICU nurse responsible takes the report, and looks over the patient and the equipment. She is the one who informs the EN about the new surgical method. The ICU nurse wants medical prescriptions for the restless patient, but as the physician has left the room she turns to the anaesthetist nurse for advice. It is also the ICU RN who calls the physicians’ attention to new prescriptions. The physicians monitor the displays and ICU records, which immediately produces new information that must be interpreted. Thus, they are ‘overseeing the local environment’ (Heath & Luff 1992, p. 83) to be able to decide what treatment the patient needs. Suchman (1997, p. 50) talks about the ‘accountable (re)-production of normal order’. She claims that social actors, who are intensive care staff members in our study, are involved in constant sense-making in their everyday practice. On one level, this sense-making is historically constructed within an institutional frame (Agar 1985), and is visible in the expected order of division of labour, organization of work, rules and regimes. At the same time, sense-making or normal order is (re)-produced ‘through the artful practices of personnel’ (Suchman 1997, p. 50).

Study limitations

There are some methodological issues to discuss in this study. One is that the field researcher has long experience of intensive care nursing and teaching. This experience could, on the one hand, impede her observation capacity in that activities could be taken for granted. On the other hand, the experience of intensive care could contribute to her understanding of situated activity in the ICU (Polit & Hungler 1999). Agar (1980) claims that ‘The problem is not whether the ethnographer is biased; the problem is what kind of biases exist’ (p. 42). By becoming aware of them, Agar means that the researcher can try to handle them as part of methodology.

What is already known about this topic

- Intensive Care Units (ICUs) are heavily equipped with technological tools.
- Technology has an impact on human beings.
- Several interview studies focusing on nurses' and patients' experiences of technology in the ICU juxtapose caring and technology.

What this paper adds

- Rather than focusing on the impact that technology has on human beings in the ICU, this *in situ* study considers the human-machine interaction.
- It shows that the everyday work of ICU staff largely encompasses routine work connected to technology.
- It argues that shared understanding of the ICU situation develops when the activities of competent staff are co-ordinated.

The second methodological limitation of the study is connected to the field notes. Agar (1980, p. 112) writes, 'Since there is a problem with memory, it is best to write things down as quickly as possible'. However, there are many activities going on while the researcher is busy writing field notes. Not everything that happens can be documented and 'When something interesting appears, note it. But don't lose the focus on the topics' (Agar 1980, p. 101). In order to test credibility (Polit & Hungler 1999), the interpretation of the data was discussed in a seminar with a group of doctoral students with practical experience of intensive care and other researchers. Discussion and reflection on the data led to consensus on the themes, the final formulations of which were a consensus between us (doctoral student and supervisor).

Conclusions

Shared understanding of the situations in ICU seems to make words redundant when the activities of competent actors are co-ordinated. Intensive care is produced here and now at the same time as the past is present in the activities. In this sense, the ICU as a workplace 'is constituted by, rather than the container for, culturally, historically, and locally meaningful forms of lived activity' (Suchman 1998, p. 35). Intensive care, as mentioned earlier, depends in part on its technology. Hutchins (1990, p. 205) claims that 'Using these tools people certainly can do things they could

not do without them' (p. 205). It could be said that the machines are actors in the ICU as well as the human beings, but that the machines cannot communicate with each other. It is the communication between staff members, verbal as well as written, that combines the information from the devices, and the technological equipment is shaped by human beings as well as the machines shaping the actions of the staff members in the ICU.

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II

Technology – an actor in the ICU: a study in workplace research tradition

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Technology – an actor in the ICU: a study in workplace research tradition

Background. The present study focuses on human–machine interaction in an intensive care unit in the West of Sweden.

Aims. The aim of the present study was to explore how technology intervenes and challenges the ICU staff's knowing in practice.

Theoretical perspective. The study's theoretical starting point draws on workplace research tradition. Workplace studies encompass the interaction between the actors' situated activities and the technological tools that make their activities possible.

Method. Fieldwork or *in situ* studies of everyday practice in an intensive care unit documented in written field notes constituted the data.

Results. The findings show first how technology intervenes in the division of labour when the taken-for-granted 'old' everyday practice is disrupted when a new machine intervenes in the morning's work; secondly, it reveals how technology challenges practical knowing and thirdly, it shows how technology reformulates practice. Staff members' awareness of routine problems is often connected to the ability to see, which is always related to cultural/contextual competence.

Conclusion. It is concluded that it is not talk alone that helps the caregivers to '(dis)solve' the problems. The ability to see the problems, the work environment and to find the relevant supporting tools for '(dis)solving' the routine problems is also crucial. But it is not possible to say that it is the skillful work of humans that solve problems, nor do we claim it is the tools that do so. Humans and tools are interwoven in the problem-solving process.

Relevance to clinical practice. Routine problems in the intensive care unit are not '(dis)solved' through the cognitive work of individual staff members alone. Problems are also '(dis)solved' jointly with other staff members. Staff members 'borrow' the knowing from each other and problems are re-represented through communication. The knowing has to be distributed among the intensive care unit staff to make the everyday work flexible.

Key words: human-technology, intensive care, interaction, routine problem, workplace

Introduction

The present study focuses on how technology intervenes and challenges the intensive care unit (ICU) staff's knowing in practice (Heath & Luff, 2000) in the ICU. Practice in this sense means organizing work, division of labour, rules and routines (Berg, 1997). Patients in the ICU need specialized medical treatment and care, which includes support from technological tools. The technology used is, for example, machinery to ventilate patients and to monitor vital functions or to regulate infusion and injections (Gjengedal, 1994). Among others, Strauss *et al.* (1985) pointed to the ICU as a context heavily equipped with various machines. The addition of one or more machines to monitor vital functions or regulate the infusion of drugs makes the supervision of the patient and the equipment more complex and could also constitute a risk to the patient (Strauss *et al.*, 1985). Accordingly, Registered Nurses (RN) and enrolled nurses (EN) monitor the displays on the machines to interpret the information given and monitoring the patients' movements, skin colour and temperature by looking, listening and touching (Strauss *et al.*, 1985). Thelander (2001), who conducted a study on how to eliminate risks and create security in cardiac intensive care, argues that risks and mistakes have to be foreseen and avoided. Creating safety, 'is a matter of making the patients' problems manageable ones through the reproduction of the staff's socially shaped understanding of what safety is' (Thelander, 2001, p. 180). In the late 1980s and the early 1990s some researchers claimed that there is tension between technology and caring in the ICU (Ashworth, 1990; Gjengedal, 1994). However, Barnard & Sandelowski (2001) argued that 'technology is not necessarily opposed to humanised care, but rather is often specifically and deliberately enrolled in the service of that care' (Barnard & Sandelowski, 2001, p. 368). In the present study, we argue, to borrow from Berg (1997, p. 146), that technology 'does not stand between the users and the task', thus technology is an integrated part of the task. Technology, in this sense, means machinery, medical treatment, documenting systems and associated skills to handle them. Accordingly, this study focuses on the relation between social and the technical interaction in the everyday activities in the ICU in order to study 'the way tool and practice are related' (Berg, 1997, p. 143). Mostly, activities in everyday practice are taken for granted or, as Suchman argues, 'when all goes well, the former is taken by participants to be previously given, largely transparent background for the work at hand' (Suchman, 1998, p. 35). Rules or prescriptions are not explicitly discussed until routine problems appear and it is no longer obvious what to do. It is the activities around such

situations that are addressed in this study. As we will argue, technology intervenes and challenges the staff's knowing in practice as the ICU staff's everyday work is closely connected to technological tools/artefacts. Accordingly, a study *in situ* of the interaction between staff and technological tools would be both valuable and interesting. Sandelowski (2002, p. 105) calls for 'studies involving artefacts or physical objects' as such studies are seldom conducted within the framework of qualitative studies of health care. In the present study, we intend to make such a contribution by encompassing humans and artefacts when the socially shaped production of intensive care is focused on.

Workplace research tradition

This study takes as its theoretical starting point the workplace research tradition following Goodwin & Goodwin (1998); Suchman (1998); Heath & Luff (2000) and Hutchins (1990). Heath & Luff (2000, p. 18, 19) argue that workplace studies are 'concerned with explicating the situated character of practical action' and that technology 'is placed at the heart of the analytic agenda'. Further, Heath & Luff (2000, p. 4) emphasize 'how little we know about the ways in which individuals both alone and in concert with each other, use tools and technologies in the practical accomplishment of their daily work'. Thus workplace studies focus on the relation between social and the technical interaction or, as Goodwin & Goodwin (1998, p. 70) put it, the relation between talk and the 'tool-saturated environment'. Goodwin and Goodwin also claim that the notion of context is central in workplace studies as it encompasses the interaction between the actors' activities and the technological equipment that makes their activities possible. The social actions of staff members in the ICU are thus analysed as being inseparable from the context where the actions take place. Workplace studies have been conducted within different technological contexts, for example, in an air traffic control room, newsrooms and an airline cockpit. Further, as workplace studies do not separate people's thinking from their doing or the context, we argue that cognition or cognitive labour is socially distributed as it encompasses technological tools and the ICU staff's individual and collaborative construction of shared understanding (Hutchins, 1995). To put it differently; it is the system/unit of ICU staff members and their technological tools that together constitute the distributed cognition. The ICU staff cannot manage to produce intensive care without the technological tools, neither are the tools in themselves interesting, it is the interaction/communication within the system/unit that is focused on in the present study.

The aim

The aim was to explore how technology intervenes and challenges the ICU staff's knowing in practice.

Participants, setting and method

The study was conducted in an ICU in a medium-sized hospital in the west of Sweden. The ICU in this hospital is the only unit that can offer respiratory treatment and most patients in the ICU setting suffer from breathing problems. During respiratory treatment, patients are often unconscious because of their diagnoses or the medical treatment, which makes it impossible to ask for their consent. The present study, however, focuses on the staff's everyday activities and not on the patients or individual staff members. It is the interaction and the communication between staff members and between staff and technology that are focused on. All the members of the ICU staff participated in the study, that is, RN, anaesthesiologists and EN. Written and oral information was given to the staff, branches of national unions and to actors in clinical management. The health care staff were assured that informed consent and confidentiality would be applied. The Research Ethics Committee of the Medical Faculty, Gothenburg University (L 285–98) approved the study.

Data collection

The empirical data in the present study have been produced through 'field work' (Agar, 1980), which includes observations of 'situated activities' (Goodwin & Goodwin, 1998) in the ICU. The data observed were documented in field notes following the ethnographic workplace research tradition. This means that data mostly consist of naturalistic or *in situ* studies of activities connected to workers in technologically intensive contexts (Heath & Luff, 2000) such as the ICU. Heath & Luff (2000, p. 20) claim that data must encompass 'talk and visual conduct of the participants'. Accordingly, data were collected through observations of everyday activities. The first author (ACW) collected the data dressed like the rest of the ICU staff in order to harmonize with the environment. The activities of the ICU staff were followed for about 5 hours a day in order to cover a multiplicity of situations, routine work and more problematic situations. Being alert for 5 hours is realistic; it is strenuous physically and psychologically to be an observer and 'see' and 'take in' what is going on. Everyday activities in the morning, the afternoon and the evenings were studied. The researcher (ACW) did not participate in the everyday activities but was

close enough to register what staff did or said, what movements they made and what technology they interacted with. The field notes were unstructured in that I did not use a schedule or any other aid, but I registered time, place, activities, what people said and did, who participated and sometimes how people were positioned in the room. The fieldwork 'depends upon the recording of complete, accurate, and detailed field notes' (Taylor & Bogden, 1984, p. 52). At the beginning of the field work in the ICU, it was not obvious what to focus on but as Taylor & Bogden (1984, p. 53) say: 'You don't know what is important until you have been in the setting for a while'. Data were collected in the autumn of 1998, the spring and autumn of 1999 and in the spring of 2000. In order to produce a 'thick description', data were collected through observations of everyday activities such as staff caring for the patient in the patient room, work connected with technological equipment, rounds and reports and in conjunction with medical treatment. Field notes were documented in conjunction with the observation or shortly thereafter and sometimes conversations with staff members at the end of the day were added to the field notes. The whole data corpus of the study encompasses 12 interviews, five tape-recorded reports and field notes from about 200 hours of observation and was transcribed verbatim. In the present study, field notes encompassing technology intervening, disrupting and challenging routine work constitute the data.

Data analysis

To acquire an overview of and to become familiar with the data, the transcribed text was first read and reread several times. Secondly, interactions, activities and events that emerged and corresponded with the aim of the study were noted in the margin. In the third phase, related text segments were brought together. When scrutinizing the text, we found a main theme encompassing technology disrupting, intervening and challenging the routine work. The main theme encompassed several episodes but only three episodes that correspond to the main theme will be presented in the results below.

These excerpts have been chosen because they illuminate different problems, different kinds of '(dis)solutions' to the problems and different staff members' collaboration with each other and the technological tools. The presentation is based on a detailed analysis of the interaction and communication between different staff members and interaction/communication between staff and the technological tools following the analysis of workplace research tradition (Hutchins, 1995; Suchman, 1998; Heath & Luff, 2000).

Results

In everyday practice in the ICU, different episodes of routine problems connected to technology appear. Consequently, it is not possible to present them all, but in the following text we have chosen, as mentioned above, to present three of the routine problems, starting with how technology intervenes in the division of labour. The second problem shows how technology challenges the practical knowing/seeing and thirdly, the ways in which technology reformulates practice will be presented. In connection with each problem, the problem-‘(dis)solving’ process is also presented as it is intertwined with the problem at hand.

Technology intervenes in the division of labour

Excerpt 1 below shows how a new dialysis machine (instead of peritoneal dialysis) called ‘the Ruby’ intervenes in the organization of the morning work in the ICU. Five RNs are standing in front of the whiteboard in the ICU. One of the RNs says that she is going to take care of the premature baby she cared for last night, the other RNs nod ‘yes’ and she leaves. The four other RNs discuss how to get on with the morning’s work.

Excerpt 1

One of the RNs (1) says: ‘I had room two yesterday, but I can’t handle the Ruby’.

RN 2: ‘I can handle the “Ruby” but I don’t know the patient’.

RN 3 says: ‘I don’t know the patient, nor can I handle the “Ruby”’.

RN 4 says: ‘I had the post.op. patients yesterday’.

RN 1 asks: ‘Who knows room three?’

RN 2 says: ‘I had him yesterday’.

RN 1 looks at RN 2 and says: ‘Then you’ll have to go to room two. Shall I take room three, then? And we must help each other, I don’t know him’.

RN 2 nods yes and says: ‘I’ll take room two and you take room three, which I had yesterday’.

RN 1 says: ‘Yes OK, but you must tell me about three’. ‘I don’t know anything about him either’,

RN 2 says and nods towards room two.

In the morning in the ICU, RNs usually gather around the whiteboard in the centre of the unit to discuss the division of labour, as they did this morning. During the night, a physician had directed that a dialysis machine be connected to one of the patients as his kidneys were not functioning. The RN (1) who was responsible for the patient the previous night could not handle the dialysis machine, which, in this case, became a problem as routine, the principle of continuity, usually structures the RNs’ division of labour in the ICU.

The three other RNs shared the understanding that this was a problem and that it had to be dealt with. They all focused on the problem and discussed how to handle it. The RNs jointly constructed the solution to the problem. It was taken for granted that knowing how to handle the dialysis machine was more important than knowing the patient. One of the other three RNs (2) could manage to handle ‘the Ruby’ and she and the RN (1) discussed whether to exchange patients with each other. Thus, it could be argued that technology preceded the patient. However, the handling of the machine was essential for the care of the patient and for his safety. Further, it could be said that ‘the Ruby’ in some way is an extension of the patient’s body, his artificial kidney, which communicates with the RN through displays. On one level, the problem can be a result of the individual RN not knowing how to handle the machine. However, it is also an organizational problem as it was related to a decision taken earlier that just one RN on each shift should be taught how to handle the machine. The RNs frequently talked about that decision as being a big problem. They felt that not knowing how to handle ‘the Ruby’ made the division of labour less flexible. This is a common problem as it is often assumed that new technology will fit into the ‘old’ everyday work and knowing in the ICU. Another reflection, which emerged in the excerpt, is the use of room numbers when talking about the patients. This is a phenomenon that has been discussed for years in Swedish health care, that the patients should not be named by numbers or diagnosis because that would lead to the dehumanization of care. Nevertheless in this episode, it could be an easy way to deal with the problem at hand, to ensure that everyone is talking about the same patient. All the RNs do not usually know the names of the patients, as mentioned before, patient care is organized according to the principle of continuity. The patients as room numbers are tools to facilitate the division of labour, it is the room number that is written on the white board beside the RN’s name and this can be seen as an institutional phenomenon. This will be discussed further in the last excerpt.

Technology challenges practical knowing

The next routine problem (see excerpt 2) is also connected with the dialysis machine, ‘the Ruby’. A patient with renal failure is being treated with the dialysis machine. When caring for a patient being treated with ‘the Ruby’, there is always one EN at the patient’s bedside and one RN who is responsible for the patient’s total care. The EN beside the patient reports to the RN that she thinks there is blood in the urinary container.

Excerpt 2

The RN 1 looks at the urinary container and says that she also thinks there is blood, but as 'the Ruby' does not react on the display, the registered nurse says that she is unsure. The RN 1 leaves the room. She returns to the patient room together with another nurse 2. The two RNs look at 'the Ruby' as well as the urinary container. The RN 2, who has been asked to discuss the problem, says that as 'the Ruby' does not react, they do not have to worry. The RN 1 in charge, who is not satisfied with this answer, fetches a urinary test stick and checks the urine. The test shows blood in the urine and the RN 1 calls for the anaesthesiologist to report what she has found. The anaesthesiologist says he wants to ask the specialist in renal failure what to do and leaves the room.

As the enrolled nurse is the staff member working closest to the patient, she was the one who was first aware of the problem. The EN has to have contextual knowledge to see what she is supposed to see. She had to know what colour the urine ought to be otherwise she would not have reacted. The RN is responsible for the total care of the patient and the EN reports her suspicion to the RN. When she looks at the urinary container, the RN also says she 'thinks' she can see blood in the urine. But as 'the Ruby's' display did not show blood in the urine, she was confronted with a dilemma: should she trust the machine or should she trust the human eye? She decides to discuss the problem with another RN but her colleague says that as the machine does not react, she does not have to bother. The dilemma is still there, should she trust her colleague who puts her trust in the tool or should she trust her own and the EN's eyes and practical knowing? In spite of the complex tool, 'the Ruby', she cannot disregard the human eye and accordingly turns to the 'old' tool, the urinary test stick which reacts if there is blood in the urine. The stick confirms her suspicion; there is blood in the urine. The RN calls for the anaesthesiologist to inform him and get a decision about what to do, but he has no answer and, in turn, refers to the renal physician. The problem with the blood in the urine was presented several times to staff members from different categories and they were all involved in the problem-solving process. Juxtaposed with the human communication, we can see more or less complex tools in action, the dialysis machine and the urinary stick; knowing in the ICU is thus intertwined with technology. We can also distinguish a hierarchy in the problem-solving process. The EN is the first to see that the colour of the urine has changed; she turns to the RN responsible who turns to a RN colleague. When the RN responsible is still unsure, she turns to the old tool, the urinary stick, before presenting the problem to the anaesthesiologist, who, in turn, shifts the problem over to the specialist physician.

Technology reformulates practice

The last excerpt (3) visualizes the problem of reformulating the physician's practical work in the formal data statistics programme.

Excerpt 3

A physician is sitting in front of a computer in the centre of the ICU, the so-called 'the Square', trying to enter a file. He fails. A RN is sitting on his left. The physician says: 'How does one enter the APACHE' (a patient statistics programme that physicians are responsible for using for documentation). It was a long time since I did it'. The RN helps him to enter the file. 'Post op. or ICU- patient? Postop'. He answers the question himself. 'Should I give her a diagnosis or should I not? She is documented as a Postop. but she sure is an ICU. Couldn't be changed, could it' The RN says 'no, it can't be changed'. The physician talks to himself: 'Easiest ICU, what's important is that she gets registered. I think she had some oxygen, why should it be so difficult. I'll do it some other time'.

As we can see, problems can be solved by a RN helping a physician. Earlier, we described how problems have been solved in an hierarchical way, ENs call for RNs, who first turn to RNs and then to the physician. But the RN in this case has practised documenting on the computer herself and as the physician is sitting next to the RN in an open place, the Square, documenting on a computer, it is possible for the RN to watch the documentation displayed. The practical work of RNs and physicians sometimes overlaps. In excerpt 3, we can also see the physician's dilemma in labelling the patient. Labelling patients or clients in the ICU and in other institutions is a way of making sense of and handling the everyday work. In this case, there is a problem: is the patient being treated postoperatively or is he an intensive care patient? The patient is registered as a postoperative patient but the physician 'feels' that he is an intensive care patient. These expressions are constructed in the ICU context and have a special meaning for staff members. This has to be understood within an institutional frame, like the use of room numbers in connection with the RNs division of labour in excerpt 1. The institution develops modes of describing the world that fit the need for, in this case, the ICU. How to categorize the patients is not a problem for physicians in everyday practice; it becomes a problem when everyday work has to be reformulated in a formal tool. The problem is also related to physicians' forgetfulness. It is difficult to remember medical treatments when the patient and the record have left the ICU. The physician in charge of the ICU says that physicians often 'forget' to document patients in the statistics programme. As an example, some months, only 17% of the

patients are registered. The documentation is a kind of institutional memory that will be used in describing and planning intensive care and thus the knowledge needs to be documented and has another meaning to actors in clinical management not least economically. To the anaesthesiologist in excerpt 3, it seems mostly an action of necessity when he says: 'what's important is that she gets registered'. Talking to oneself, as the physician does in the excerpt (3) above, is a common way of helping oneself to organize a difficult task or solve a problem in the ICU. In some way, talking to oneself also could be a way of indirectly telling others that: 'I hope you can see that I am occupied with a difficult problem and I don't want to be disturbed'. However, it could be meant as an invitation to take part.

Discussion

The present study has investigated how technology intervenes and challenges the ICU staff's knowing in practice. We argue that technology can be described as actors that intervene and challenge knowing in practice in the ICU. We have shown how the dialysis machine, 'the Ruby', intervened in the nurses' organization of the morning's work. Technology was placed at the forefront or, as Barnard (2000, p. 1139) puts it, 'daily practice of nursing can be altered by the demands of machinery and equipment'. In some way, supporting tools make practice easier. 'The Ruby' is, just like the injection pump, a replacement for the RN as it also performs the work RNs usually do. However, findings also reveal that technology makes everyday work more complex (Strauss *et al.*, 1985). Staff members become aware of routine problems when the everyday work is disrupted in some way. There was only one RN who could handle the 'Ruby' and that led to less flexibility in the division of labour in the morning, yet the RNs managed jointly to solve the problem. In his study of navigation, Hutchins (1995, p. 206) argues that routines such as division of labour are often 'violated' in everyday work. He also notes that team members usually solved such routine problems in concert: 'Not only are members of the team responsible for their own jobs, they seem also to take responsibility for all parts of the process to which they can contribute'. In the scene where the EN thought she saw blood in the urinary container, we argue, like Goodwin & Goodwin (1998), that awareness was connected to 'the seeing'. Here, 'seeing' means that the ability to see is a social process that is always connected to cultural/contextual competence. But as the RN became unsure about how to interpret her 'seeing', the 'Ruby' did not display blood, she turns to a colleague. The other RNs' participation in the problem-solving process is an expression of collective responsibility (Suchman, 1997),

which means that staff members are sensitive to each other and to the situation they take part in. Hutchins (1995, p. 211) calls this acting 'helping actions', for example when the RN helps the physician in his documentation practice. Juxtaposed with human interaction and communication, we can also see how less complex technology is also intertwined with the problem-(dis)solving' process. Another form of technology or tool in the ICU is the institutional labelling of patients like the use of room numbers in the division of labour (excerpt 1) and in excerpt 3 when the physician tries to categorize the patient in the ICU statistics programme (Sätterlund Larsson, 1989; Johanson, 1994). As Berg (1997, p. 146) puts it in his study of the electronic medical record, 'Nurses, physicians, the formal tool – all have only partial knowledge'. Talking to oneself when solving problems, like the physician does, is a common activity in the ICU. Heath & Luff (1992, p. 80) have interpreted 'self talk' in an underground line control room in the following way; 'Talking through the timetable, whilst rendering "private" activities "publicly" visible, avoids establishing a "recipient" mutual engagement with colleagues which could undermine the ongoing accomplishment of the task in question'. Routine problems are solved through staff members' shared understanding of the situation and joint focus on solving the problem or, as Hutchins & Klausen (1998, p. 19) claim, 'cognitive labour is socially distributed'. The problems are 're-represented' and moved to 'another domain' (Hutchins, 1990) through interaction between humans and more or less complex technology. The notion of complex environment would fit the ICU as the work is highly differentiated and specialized. The problem-solving process thus often seems hierarchical. Different staff members 'bring a different work history and thus a range of different skills' (Goodwin & Goodwin, 1998, p. 85). But it is not possible to say that it is the skillful work of humans that solves problems, nor will we claim that it is the tools that do this. In the process of problem solving, humans and tools are interwoven.

Study limitations

The data in the present study have been produced through observations documented in field notes. One problem with field notes is that activities are in progress while the field researcher is documenting (Agar, 1980). It is not possible to document everything that happens in the observed situation. Accordingly, data in workplace studies are usually videotaped. But for ethical reasons, it was not possible to videotape in this study. Another problem with field research, if the researcher is experienced in the field, which is the case in the present study, is that activities may be taken for granted and interesting activities could escape the observer. But, referring

to Goodwin & Goodwin (1998), could cultural knowledge of intensive care increase the observer's ability to see? In order to test credibility (Polit & Hungler, 1999), the interpretation of data has been analysed in seminar discussions with doctoral students and other researchers. Subsequently, the two authors of the study reached a final consensus on the themes by discussing and reflecting on the data material in relation to the aim of the study.

Conclusion

The ICU staff does not solve or 'dissolve' routine problems solely through individual cognitive work. Problems are also 'dissolved' together with other members of the staff through communication. They rely on their cultural knowledge and their shared expectations of how things will go. But it is not talk alone that helps the caregivers to '(dis)solve' the problems. The ability to see the problems, the work environment and finding the relevant supporting tools to 'dissolve' the routine problems is also crucial. Staff members 'borrow' the knowing from each other and problems are re-represented through communication. The knowing has to be distributed among the ICU staff to make the everyday work flexible.

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Contributions

Study design: A-CW; data analysis: A-CW; manuscript preparation and literature review: A-CW; supervisory contribution: USL.

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4 The meaning of technology in an intensive 5 care unit—an interview study

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KEYWORDS

Accounting practices;
Intensive care;
Meaning making;
Technology

Summary

Background: Previous research has discussed that technology may dehumanise the patient care but also that technology may restrict nurses' freedom of action. This raises questions about the relationship between technology, care and medicine in units where the patient's need of treatment is a case of emergency.

Aim: The aim of the study was to explore how staff members in an intensive care unit (ICU) make sense of technology in their everyday practice.

Method: Twelve staff members from one ICU were interviewed about their understanding of technology in their everyday practice.

Result: Three main findings emerged from the analysis: Technology seems to be considered decisive for the treatment as it directs and controls medical treatment and results in the patients' well being; technology is seen as facilitating the everyday practice because it makes the treatment more secure and decreases the workload; however technology can complicate the staff members' everyday practice as it is not completely trustworthy, is not easy to handle and can cause ethical dilemmas.

Conclusion: Contrary to previous findings this study shows that technology seems to be embedded in the care and medical treatment. Furthermore, the meaning of technology appears to be dependent on the different staff members' accounting practices.

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Introduction

When entering an intensive care unit (ICU), it is obvious that the seriously ill patients and their relatives are surrounded by technical tools in a high-technology environment. Most of the intensive care patients are unconscious and not aware

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of what is happening to them in the ICU. Their lives are in the hands of the ICU-staff.

The ICU developed in the early 1960s intending to treat and take care of seriously ill patients by specially trained staff members, using advanced technical tools. The technological development has evolved at a rapid pace during the last centuries. The handling of the technical tools such as ventilators, injection pumps and monitors thus makes the care giving more specialised and complex to manage. In addition, the division of labour between the staff members and the technical tools continuously has to be shaped and reshaped as new instruments are introduced on the arena (Hutchins, 1990).

The ICU involves different staff members such as enrolled nurses, registered nurses and anaesthetists. Söderberg (1999) has studied such team members' experiences of ethical dilemmas in connection to technology in the ICU. She found that the different professionals emphasised varying dilemmas when narrating their experiences. Söderberg's conclusion was that these differences could be explained by the fact that the professionals thought about different cases when describing their experiences with technology.

Other previous studies (Barnard, 2000; Gjengedal, 1994; Granberg et al., 1999; Norrie, 1995) about the influences of technology in care giving have focused on registered nurses' and patients' experiences of technology within the ICU. The conclusions were that technology may dehumanise the patient care in that technology restricts the nurses' focus on the patients' social needs (Gjengedal, 1994; Granberg et al., 1999) and that technology restricts the registered nurses' freedom of action (Barnard, 2000; Norrie, 1995). Barnard and Sandelowski (2001) questioned this dualistic approach to nursing and technology and Barnard (2002) suggested a re-examination of this dichotomising between nursing and technology.

The present study can be seen as a re-examination of nurses' understanding of technology but it also explores how anaesthetists and enrolled nurses construct meaning of these tools. To our knowledge no previous study has addressed the question of how different professionals in the same ICU perceive technology. The aim of this study is therefore to explore how these staff members make sense of technology in their everyday practice.

The research questions are:

1. How do the different staff members talk about technology in their everyday work?

2. Are there any differences and/or similarities in their statements?

Theoretical background

From a socio-cultural perspective our perception of the environment is connected to our socio-cultural experiences (Wertsch, 1998). When two people look at the same situation they often "see" different things (Säljö and Bergqvist, 1997). The understanding of what we see is thus, from this perspective, connected to the knowing in practice, or to put it differently, their 'accounting practices' (Johanson, 1994; Shotter, 2000). In this sense, accounting practices set limits for our vision, but they also make it possible for us to see anything at all (Johanson, 1994). There have been studies focusing on accounting practices that show how different doctors and patients as well as teachers and pupils perceive the same phenomenon depending on their level of knowing (Johanson, 1994; Säljö and Bergqvist, 1997). Studies have also shown how staff members in the same institution perceive the same phenomenon in different ways due to their knowing in practice. From their varying positions staff members learn how to read a scene (Suchman, 1997) and what is to be seen as relevant in their particular practice; how to talk, act and make sense (Shotter, 2000; Suchman, 1997). In Goodwin's words they create a 'professional vision', which direct the seeing and understanding of everyday practice (1994). This means that they from their different positions interpret the institutional understanding in how to make sense of their work (Cederborg, 1999; Suchman, 1997, 2000; Säljö and Bergqvist, 1997). The understanding of how to act in an institutional setting can hence be described as situated and achieved for practical purposes and thereby connected to the knowing in practice (Cederborg, 1999; Goodwin and Goodwin, 1998). Accountable team members can be described as professionals who act in a responsible and skilled manner, i.e. competent team members. They take responsibility for their conduct so that they fit into the institutional condition (Mäkitalo, 2003). However, in institutional contexts where different accounting practices exist, negotiations about how to understand various phenomena is constantly shaped and re-shaped (Wenger, 1998). In this study different professionals' perception of technology is the phenomenon in focus. The findings are understood from a socio-cultural perspective where technical tools or artefacts are seen as incorporated in professionals' everyday practice.

Method

The data in the present study was drawn from the larger project *Communication and Technology—a study in a technological environment in health care* (Sätterlund Larsson and Wikström, 1998). The project was conducted as a field study drawing on ethnography in a general intensive care unit in a medium-sized hospital in the west of Sweden. The overall research question for the project was “How is intensive care produced?”.

Within the ethnographic field informants’ accounts are important elements in the field studies (Hammersly and Atkinson, 1983). According to Kvale (in press), one way to uncover the informants’ perspectives is by qualitative interview, which has been conducted in the present study. The theory that meaning is constructed contextually and that interviews can catch “events in the real word” (Mishler, 1996, p. 35) has also influenced how this study was carried out and analysed. The questions asked and the answers given in the interviews are understood as a production of the prerequisites they were given.

The Research Ethics Committee of the Medical Faculty, Gothenburg University (L 285-98) has approved the study.

Data

The data produced in the larger project consists of observations of everyday practices, tape recorded reports of nurses delivering information about the patients and an interview study with registered nurses, enrolled nurses and anaesthesiologists. The latter will be dealt with in the present study. The data from observations and reports will be dealt with elsewhere. Twelve persons participated in the present interview study; four registered nurses, four enrolled nurses and four anaesthetists. The interviewees were selected from their level of experience, i.e. the amount of their working years in the ICU. The nurse in charge and the chief physician were asked to give the names of all the team members working in the unit. The two most as well as the two least experienced team members indicated by these two professionals were asked to participate in the study. They all agreed to participate. Consequently in each of the three groups there were two respondents who had more than 10 years of experience from intensive care whereas the rest had worked in the ICU for less than 2 years. The health care staff members were assured that consent and confidentiality would be maintained. This is why the informants are not being

presented with their age, education or sex. To prevent recognition the anaesthetists are called he and the registered nurses and enrolled nurses are called she.

Interviews

The aim of the qualitative interviews was to capture the different ICU staff members’ perspective on the meaning of technology (cf. Hammersly and Atkinson, 1983; Kvale, in press). To avoid possible influences from the interviewer on how interviewees make meaning of the technology in the ICU (cf. Mishler, 1996) open questions and a semi-structured interview guide were used by the interviewer. The questions asked concerned the participants’ perception of technology in their different areas of responsibility. They were invited to freely express their experiences of medical technology (for example “tell me how you handle technology when.”). The interviewer listened actively in order to detect nuances and to ask open follow up questions (why, how, when, which questions) that could deepen the understanding of their information (cf. Kvale, in press). Each interview was tape-recorded and lasted between one and one and a half hour. They were conducted in a calm place within the ICU.

The interviews were transcribed verbatim and each manuscript was read multiple times before the main analysis started. The data consists of a total of 222 written pages (anaesthetists 51 pages; enrolled nurses 75 pages; registered nurses 96 pages).

Analysis

The qualitative analysis was based on an inductive search for categories that could explain what technology meant to the different informants and how they made sense of technology in their everyday practice (Hammersly and Atkinson, 1983; Kvale, in press). The first reading of the data gave an overview of what the informants had said. The next step was to find text segments that dealt with technology and also how the informants made sense of the technology. By reading the transcribed text segments back and forth the first author coded the themes and the sub themes that concerned the aim of the study (cf. Polit and Hungler, 1999). The analysis was performed through a consensus process where similar themes were clustered together and those not relevant to the study were excluded. In order to increase credibility the other authors checked if the examples and the sub-themes fit under each theme as well as responded to the question of the study. There was 97% agreement. Disagreement was resolved through discussion.

218 Result

219 When analysing how the professionals construct
220 meaning of technology three main themes emerged
221 from the analysis; *technology is decisive*, *technol-*
222 *ogy is facilitating and technology complicates*. Each
223 theme is presented with its sub themes.

224 Technology is decisive

225 Technology seemed to be understood by the anaes-
226 thetists and the registered nurses as decisive and
227 they described technology as a support they trust
228 in their everyday practice. The sub-themes were:
229 *technology directs and controls medical treatment*
230 and *technology leads to the patients' wellbeing*.

231 Technology directs and controls medical 232 treatment

233 The experienced anaesthetists talked about tech-
234 nology as directing and controlling their decisions
235 about care and treatment. They described this,
236 using different examples from quite simple tools
237 such as the pulse oximetry to more complex and
238 new equipment illustrated by one of the anaes-
239 thetists in the following excerpt.

240 A1: We changed the supervision equipment last
241 year, so we can monitor the patients ade-
242 quately and follow vital parameters. We also
243 work with treatment, such as vasoactive drugs
244 for the circulation, and we have to direct
245 this treatment by measuring invasive and non-
246 invasive blood pressure as well as central
247 venous pressure.

248 His utterance was connected to his practical
249 knowledge and it seemed as if new technology was
250 decisive for the medical treatment.

251 Another less experienced anaesthetist expressed
252 that technical tools were decisive for prevention of
253 physiological problems.

254 A3: When the patients are in the ICU they are
255 totally monitored. We monitor blood pressure,
256 heart rate and oxygen saturation.

257 This utterance could be understood as if
258 technology guided this physician when deciding
259 about medical treatment. This young anaesthetist
260 appeared to consider technology as the base for
261 how to monitor the ICU patients' physiological con-
262 dition.

263 The anaesthetist is responsible for the medi-
264 cal treatment of the severely ill patients in the
265 ICU. Such a position requires knowledge about
266 prescribed medical treatment to the patient, for

267 example, how to balance drugs to vital functions
268 and how to measure vital parameters. Their respon-
269 sibility of the everyday practice can therefore
270 explain why the anaesthetists mostly talked about
271 their relationship with technology in terms of pre-
272 scribing drugs, infusions, and deciding a range of
273 functions on the ventilator. One of the anaesthetists
274 used a medical metaphor to explain the necessity to
275 use "complex technology". He said "To use nore-
276 pinephrine on a septic shock without measuring the
277 cardiac output is like treating a hypertonic without
278 measuring the blood pressure".

279 But also the registered nurses' utterances about
280 technology could be interpreted as technology
281 being decisive to their assessment of the patients'
282 condition:

283 RN3: I participated in the Red Cross, where we
284 needed to help people outside the hospital in
285 emergency situations without having anything
286 but a piece of plaster. I really felt I wanted
287 those things then to help assess the patients'
288 condition.

289 Technology was described as taken for granted in
290 situations of assessment. This became obvious for
291 her when she had to assess a patient's condition
292 outside the ICU where she did not have access to
293 technical tools.

294 Technology leads to the patients' wellbeing

295 The registered nurses are responsible for the total
296 care of the patients and they said that technology
297 was decisive for the wellbeing of the patients.

298 RN2: Every ICU patient now has an arterial line. It is
299 so simple; we do not have to disturb them all
300 the time but can see it on the screen. We also
301 have injection pumps and the patients get
302 analgesia and sedating drugs continuously.
303 This is good for the patients.

304 RN1: We can clearly see that the patients feel
305 better these days. The ventilator is almost
306 guided by the patients' breathing instead
307 of the opposite. It is more comfortable for
308 them.

309 These registered nurses have been working in
310 the ICU for more than 10 years. When saying "we
311 do not have to disturb them" the nurse seemed to
312 refer to the knowledge in contemporary intensive
313 care, meaning that resting and sleeping are crucial
314 for the wellbeing of the patients during their
315 ICU stay. Both of the nurses seemed to express
316 that technology brings about qualitative care to the
317 patients.

Technology is facilitating

Anaesthetists, enrolled nurses as well as registered nurses expressed that technology can facilitate the treatment. The two sub themes were: *technology makes treatment more secure* and *technology decreases the workload*.

Technology makes treatment more secure

One enrolled nurse with more than 20 years of experience in caring expressed that technology had changed and developed her practice and made it more secure.

EN2: There is more security now. I was working in the ICU when we enrolled nurses were sitting watching the premature babies. We did not have any oximetry, we learned to see and trust the colour of the babies because we did not have anything else. Of course this made us tense. I used to keep switching the light on and off not to miss anything. It feels good now when we can see the oxygen saturation all the time.

When the relevant technology was not developed she had to make the assessments based on what she saw with her own eyes. With the technology she did not have to rely solely on her own observations, because nowadays machines were there to support her observations.

Technology decreases the work-load

When the interviewer said, "you have got new ventilators and oscilloscope" to an experienced enrolled nurse she answered:

EN1: Yes, and food pumps and everything.

and another experienced enrolled nurse said:

EN2: Now we have good supportive equipment such as patient lifts. Before we had to lift them by ourselves so we could make the bed. I am almost surprised that I have managed. I have only once had a backache.

The enrolled nurses talked about the technology they used in their everyday practice like feeding the patients and make the bed. Using food pumps and patients' lifts was described as reducing manual work, as well as saving time and the staff members' bodies.

A registered nurse also talked about how "the Ruby", the new dialysis machine, had facilitated her work:

RN1: With the old system we counted every half hour, day and night. We got all sweaty. Now,

it is all coming automatically. You do not have to count at all; it is just to push the buttons.

Before "the Ruby" machine (a dialysis machine that replaces the old peritoneal dialysis), the registered nurse changed bottles with fluid that rinsed the blood through the peritoneum and she had to count how much of the fluid that was going in and out from the patient's body. Now, it was "just to push the button", because "the Ruby", a digital dialysis machine, was programmed to do the registered nurses' previous job.

Technology complicates

In spite of being decisive and facilitating technology also seemed to complicate the interviewees' work in the ICU in that technology challenges the staff members' knowledge in practice. Sub themes were: *technology is not completely trustworthy*, *technology is not easy to handle* and *technology can create ethical dilemmas*.

Technology is not completely trustworthy

One experienced enrolled nurse expressed how insecure she can become when different types of tools show varying blood pressure:

EN2: You have to be cautious. It happens that the digital measurement does not match the manually taken.

To the question "which do you trust the most" this enrolled nurse answered "the manually taken". She discriminated between digital and manually taken measurements, but in fact when she said "manually", she related to the less complex tool the aneroid cuff and a stethoscope. In spite of new digital technology she said that the less complex tool is the more trustworthy.

The insecurity of new digital technology was also expressed by a less experienced enrolled nurse:

EN3: There is a lot of monitoring; that is why I am in the patient room all the time. You cannot trust it to a 100%, though. I actually have to watch the patient.

In the interview she also said "you have to have your ears and your eyes with you". Her utterances may be interpreted as if she trusted her own observations of the patients by watching their faces, movements, and skin colour more than the digital measurements.

The technology is not easy to handle

In spite of possessing more or less experience, anaesthetists as well as enrolled nurses and reg-

415 istered nurses expressed ambiguity in relation to
416 complex technology. An example uttered by an
417 experienced anaesthetist is illustrated in the fol-
418 lowing excerpt:

419 A2: There are other technical developments which
420 are more complicated and not used so often.
421 They can constitute a risk if you cannot han-
422 dle them. Those pulmonary arterial lines are
423 complicated, for example. If there is to be
424 any value in using them, continuity is needed.
425 Technology makes it possible to do more and
426 more.

427 This anaesthetist discriminated between
428 advanced and simpler technical tools when express-
429 ing his experiences. The complex, pulmonary artery
430 lines tool was described as complicated to use
431 and he was not quite familiar with it either. He
432 expressed a risk of incorrect treatment if an
433 anaesthetist is not trained in how to use a certain
434 technical tool.

435 Another physician who was less experienced
436 uttered his worries of not being able to handle the
437 technology in a competent way:

438 A3: When you begin here, you sit during the rounds
439 and words fly about in the air. You understand
440 half of it. Then after a while you find yourself
441 regulating and adjusting different machines.
442 You learn how to handle them and there is noth-
443 ing strange about them anymore.

444 When he was a "new" anaesthetist in the ICU
445 he participated in the more experienced anaes-
446 thetists' everyday practice such as the rounds.
447 In this communicative practice he was intro-
448 duced to words and machines he was not familiar
449 with. He expressed an uncertainty about how
450 to manage the instruments when being new at
451 work.

452 One of the more experienced registered nurses
453 also talked about new technology as complicated
454 and scary when not having been trained in how to
455 use it.

456 RN2: We were mighty irritated when we got our
457 "Ruby", the dialysis machine. Only one RN
458 in each team had been taught how to use
459 it. Then we got a patient who needed to be
460 treated by the machine and we did not know
461 how to do it. That is not the way I want it.

462 She was irritated because she was not taught
463 enough about how to use a specific technical tool
464 before she had to treat a patient with it. This igno-
465 rance was expressed as an uncertainty in how to
466 perform as a nurse and that her uncertainty could

467 cause a risk of patients and relatives experiencing
468 the treatment as insecure.

469 Technology can create ethical dilemmas

470 Technology shapes the possibilities to achieve more
471 efficient treatment but it may also be a source
472 of ethical dilemmas. The more experienced anaes-
473 thetist talked about his dilemma when he had to
474 decide whether or not to use or withdraw med-
475 ical treatment. This is described in the following
476 excerpt:

477 A1: The question arose; what should we do? Then
478 you have to think of those who have recover-
479 ed and come and visit us and who we hardly
480 recognise. That is so much fun.

481 It appeared as if the opportunity to save lives
482 using technology could cause an uncertainty about
483 when deciding if life could and should be ended.
484 He expressed an ambiguity about what they can
485 accomplish in the ICU. When he was doubtful about
486 the content of his work he reminded himself about
487 those who have recovered. Such a strategy seemed
488 to convince him of the importance of using available
489 technology.

490 One of the less experienced registered nurses
491 also talked about ethical dilemmas in connection
492 to medical treatment. She said:

493 RN4: First, we are to give them everything and then
494 suddenly we are to withdraw. This confuses
495 me as a nurse, not to mention the relatives.
496 Physicians do not always tell us what they
497 think.

498 Her utterance could be interpreted as if neither
499 the nurse nor the relatives were involved in the
500 medical decision making. This could be a problem
501 not only for her in her everyday practice, but also
502 for the relatives.

503 Discussion

504 The present study has been conducted in an ICU
505 setting heavily equipped with technical tools which
506 different staff members are supposed to manage
507 when giving treatment to severely ill patients. The
508 results should be seen as tentative because the
509 sample was small and the findings originated from
510 interviews. The main finding supported, however,
511 the critics of the previous understanding of tech-
512 nology as separated from nursing and medicine
513 (Barnard, 2002; Barnard and Sandelowski, 2001).
514 Instead it seemed that technology was a tool
515 embedded in these activities and it was in the net-

516 work between people and technical tools that the
 517 tools came to life (Berg, 1997). This meant an inti-
 518 mate relationship between people’s actions and the
 519 technical tools they used (Suchman, 1997).

520 The participants described that they have inte-
 521 grated technology as an essential tool when
 522 performing their work. Registered nurses and
 523 anaesthetists talked, for example, about tech-
 524 nology as decisive for their everyday practice
 525 irrespective of their experiences. Anaesthetists
 526 focused on technology as decisive when controlling
 527 and directing medical treatment. The registered
 528 nurses, who have the overall responsibility for the
 529 patients and the relatives’ wellbeing, constructed
 530 the meaning of technology from the perspective
 531 of the patients’ care. They talked about new
 532 technology as “good for the patients”. Even if
 533 technology seemed to be important in care and
 534 medical treatment, technology may also be experi-
 535 enced as complicating the different staff members’
 536 everyday practice. Especially the enrolled nurses
 537 expressed that the technology was not completely
 538 trustworthy. They emphasised the need to observe
 539 the patients’ condition and not just to trust what
 540 the technology measured. This could be understood
 541 in the light of research showing that technology may
 542 dehumanise the caring of the patients as technol-
 543 ogy and caring are dichotomised (Barnard, 2000;
 544 Gjengedal, 1994; Norrie, 1995). This means that
 545 technology may constitute a risk that the patients
 546 will not be perceived as human beings in such a
 547 technological environment as the ICU. The enrolled
 548 nurses, however, seemed to consider the patients as
 549 human beings rather than objects understood from
 550 technological measures. On the other hand, their
 551 human understanding could be explained by the
 552 fact that the enrolled nurses spent a great deal of
 553 time with the patient and were expected to register
 554 and report all changes in the patients’ condition.
 555 Their problem with technology may have been that
 556 they lack competence in how to interpret the mean-
 557 ing of the machines, for example, changes in the
 558 electrocardiogram. Both the registered nurses and
 559 anaesthesiologists were supposed to possess such
 560 competence.

561 Technology appeared to be perceived as chal-
 562 lenging and a bit scary to the newcomers in the
 563 ICU. The terms and management of the technical
 564 equipment were described as strange words and
 565 devices that were not yet embedded in their prac-
 566 tice when they started to work at the ICU. Over time
 567 the newcomers learned from more experienced col-
 568 leagues in their own profession how the technology
 569 worked. Experienced registered nurses also talked
 570 about how technology could complicate their work.
 571 They expressed a fear that their lack of knowledge

and expertise dealing with the equipment could be
 perceived by families as inadequate or improper
 care of the patient. If newcomers and experienced
 professionals are unable to understand technology,
 the inbuilt expectation of receiving secure treat-
 ment may be altered. Such ignorance can cause
 the risk of losing face in front of the patients and
 their relatives (cf. Goffman, 1981). However, igno-
 rance can also constitute a clinical risk to patients,
 which one of the anaesthetists expressed in con-
 nection to the use of complex technology such as
 the pulmonary arterial lines and registered nurses
 in connection to treatment with the new dialysis
 machine.

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 586 The findings of this study indicated that the
 587 professionals constructed meaning of technology
 588 depending on their accounting practices. This was,
 589 for example, found in the anaesthetists talk about
 590 technology which facilitates their decision about
 591 medical treatment. Registered nurses mentioned
 592 the dialysis machine as a facilitator in that most
 593 of the nurses’ earlier actions like counting fluid
 594 had been exchanged for the “Ruby” machine. The
 595 enrolled nurses were the only staff members who
 596 talked about food pumps and patient lifts as facil-
 597 itating instruments. In terms of Goodwin (1994),
 598 this could be described as if their accounting prac-
 599 tices were their “bodies of expertise”, and thus as
 600 an insignia of different staff members’ knowledge
 601 in practice. The construction of staff members’
 602 meaning of technology could thereby be understood
 603 as inseparable from their knowledge in practice
 604 (Suchman, 1997, 2000; Säljö and Bergqvist, 1997;
 605 Wertsch, 1998).

606 It has previously been shown that physicians
 607 seldom involve registered nurses, patients or rel-
 608 atives when deciding about prolonging or ending
 609 life-sustaining treatment (Svantesson et al., 2003).
 610 In this study, the anaesthetists described that they
 611 could experience ethical dilemmas when making
 612 medical decisions about ending a patient’s life. Reg-
 613 istered nurses, on the other hand, expressed their
 614 frustration about not being sufficiently informed
 615 and involved when these decisions were made. It
 616 was the nurses who followed the directions given
 617 by the anaesthetists, and information about the
 618 medical decision making process may have facil-
 619 itated the nurses’ activities with the patients.
 620 In addition, by discussing ethical dilemmas with
 621 nurses, anaesthetists may have obtained further
 622 knowledge about the patients and their relatives
 623 that in turn could have justified ethical aspects
 624 of their medical decisions. In line with previous
 625 research this study suggests that there seems to be
 626 a need for communicative improvement between
 627 anaesthetists and nurses when making their deci-

sions of the patients' care. This communication should be initiated by anaesthesiologists but also by nurses. Registered nurses need to ask questions when they are uncertain about medical directions and mediate their interpretation of the patient's and relatives' needs.

Study limitations

The present study is included as a part of a field study drawing on ethnography and could be seen as a complement to participant observations. The interviews gave the informants the opportunity to express their meaning of technology to the researcher (author one) (Hammersly and Atkinson, 1983). It could also be seen as a way for the researcher (author one) to test the credibility of the interpretation of the field notes. However, one limitation of the present study could be that the first author, also the interviewer, has a long experience of intensive care, which might have influenced the understanding of the data. On the other hand, cultural knowledge can increase the researcher's ability to perceive interesting findings. In order to test credibility the interpretation of the data has been analysed in seminar discussions and between the three authors until consensus was reached. Trustworthiness of the results is also assured by giving examples from the interviews when describing different findings. Another limitation of the study is that only twelve professionals, four anaesthetists, four enrolled nurses and four registered nurses are represented in the interviews and all of them are from a medium-sized hospital in Sweden. Besides, we know how they narrate their experiences, but we do not know how they actually act. On the other hand, no previous study has explored how these professionals construct meaning of technology and the findings can therefore serve as a starting-point for further studies.

Conclusion

In spite of its limitations it is shown that the construction of meaning is dependent on education and experiences, but also on the professionals' position in the network of technology in the ICU.

However, the construction of meaning seems to be mutually dependent. The accounting practice is produced and developed through the professionals' actions and communication at the same time as their understanding is depending on the prerequisites they are given from the institutional context they are involved in. In addition, the meaning of

technology has to be understood as an active process where formulations and constructions develop over time.

Even if this study presents information of possibilities and difficulties with technology usage in an ICU, there is a need to further understand how these findings may be related to a larger sample of varying professionals. Even more important is the need of studies about how professionals' construction of meaning is manifested in their everyday practice. Such knowledge can increase our understanding of sense making in practice which in turn can illuminate and develop team work and co-operation in everyday practice.

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IV

Morality in discourse in an intensive care unit

- a field study -

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ABSTRACT

Background: Previous research on moral issues in an intensive care unit (ICU) has mostly focused on end-of-life questions specifically and has not addressed morality in discourse in general in the everyday practices in an ICU.

Aim: To explore and illustrate what topics of a moral character the staff at an ICU are discussing and how moral values are negotiated in their everyday practice.

Method: Drawing on ethnography, fieldwork was carried out through participant observations combined with field notes. A qualitative analysis of the transcribed field notes was conducted.

Findings: Negotiations of moral values were interwoven in: Assessment of: a) patients' life styles, often connected to the use of alcohol, b) medical decisions, c) other professionals (in)competences, d) other institutions' activities.

Criticism of others' behaviour was mostly discussed in secret, but when someone was rebuked it was done in a neutral manner, however in hierarchal order.

Conclusion: There is a risk that unchallenged and unreflecting moral values influence the care given in a negative way. In order to make unbiased decisions and give unbiased care it is important to increase the knowledge about each other's values, perspectives and working conditions.

Keywords: ethnography, intensive care, morality in discourse, moral values

MORALITY IN DISCOURSE IN AN INTENSIVE CARE UNIT – a Field Study

Introduction

Technology in health care, and in intensive care units (ICU) in particular, has evolved tremendously in the last decades. The development of new complex technologies, operation methods and potent drugs has changed the possibilities to successfully treat severely ill patients. However, an extensive use of technology may also create ethical dilemmas (Söderberg, 1999). Svantesson, Sjökvist and Thorsén (2003) illuminate that physicians often solved ethical dilemmas, such as medical problems, and Baggs and Schmitt (2000) as well as Breen and Abernethy (2001), found that disagreements were common among health care personnel about the level of medical treatment. Bunch (2000) in turn claims that it is end of life questions, resource allocations and questions of justice in connection to organ transplants that make ethical dilemmas emerge in the ICU context. The aforementioned researchers thus focus on moral and ethical issues in connection to end of life decisions.

In an earlier study of an ICU, we found differences among the staff in how they made meaning of technology (Wikström, Cederborg & Johanson, 2007). Those of the anaesthetists' utterances about the meaning of technology which were interpreted as moral issues, were connected to medical decisions not solely related to end-of-life decisions. The nurses, on the other hand, expressed that the anaesthetists made decisions which could be seen as causing moral dilemmas when giving treatment and when

communicating with patients and relatives. This finding shows that ethical and moral issues occur in talk not only in connection to decisions of life and death, but also in other everyday practices.

To our knowledge, no previous study has addressed the issue of morality in discourse within the context of an ICU, where different staff members are participating without focusing on end-of-life questions. Therefore, we intended to find out how talk about morally sensitive issues appear in an ICU setting. The concepts of morals and morality can be described as evaluative and normative attitudes to phenomena such as, for example, life and death, lifestyles, politics, organisations, people's conduct and personalities (Linell & Rommetveit, 1998). Following Bergmann (1998), the understanding of ethic (Greek) and moral (Latin) issues are considered equivalent in this study.

THE AIM

This explorative study aims to illustrate what topics of a moral character the staff at an ICU discuss and how moral values are negotiated in their everyday practice.

THEORETICAL PERSPECTIVE

The theoretical understanding is based on a socio-cultural perspective which explains how discursive practices are built by people communicating with each other (Shotter, 2000; Linell & Rommetveit, 1998). To attain a shared understanding, people go on negotiating meaning in everyday practice.

According to Shotter (2000), the essence of these negotiations is that people respond to other people's utterances. It is through communication and dialogues that people come out as moral human beings (Bergman, 1998). In addition, how we talk, remember, imagine and learn is dependent on the interrelationship between the setting and its resources.

Communication cannot be separated from how activities are carried out (Bruner, 1996; Wertch, 1998). Nor can morality be separated from human communication as moral values always are present in dialogue (Bergman, 1998). Hence, social conduct will always be taken into account as our behaviour can be judged as (in)correct, (im)proper or (dis)honest (Drew, 1998). Further, Drew claims that when we report on someone else's conduct, moral opinions are implicitly entwined in the utterance. Social conduct is therefore constituted and negotiated through dialogue in which people reason about right and wrong in the context where they act and interact (Linell & Rommetveit, 1998). Thus, interaction and morality cannot be separated from each other even when the words used are neutral; it is almost impossible to avoid expressing opinions on other people.

Various types of moral issues arise depending on what type of discursive practice one belongs to (c.f. Säljö, 2001). Goffman (1981) claims that morality always is present in social institutions such as the health care. For example, morally sensitive topics such as sexuality, excess weight, smoking and drinking alcohol are dealt with in health care, but usually in a distanced manner (Johanson, Larsson, Säljö & Svärdsudd, 1995), probably in order not to embarrass the patients (Adelsvärd & Sachs, 1996; Heritage & Lindström, 1998; Baggens, 2001).

METHOD

The project and the setting

The data in the present study was drawn from a larger project presented by Sätterlund Larsson & Wikström (1998). The overall aim with the project was to explore what the ICU staff do and say when they produce intensive care. The project was conducted as a field study drawing on ethnography and it was carried out in a general intensive care unit in a medium-sized hospital in the west of Sweden. This particular ICU cares for patients of different ages and different diagnoses and it is the only unit in the hospital that can offer respiratory treatment.

Ethical considerations

When the chief clinician at the ICU had given his consent to the project, oral and written information about it was obtained. The ICU staff were told that a researcher would stay in the ICU for some time observing and documenting what they said and did. As the patients in the ICU mostly are unconscious, it was not possible to ask for their consent. However, it was neither the patients that the study focused on, nor individual staff members, it was the ICU staff's communication and interaction as a whole that was in focus. Informed consent and confidentiality was assured. The Research Ethics Committee of the Medical Faculty, Gothenburg University (L 285-98) has approved the study.

Data collection

As it was the ICU staff's communication in everyday practices that was in focus, the study was carried out "in situ", i.e. in the ICU context. The data involved field notes from lengthy visits in the ICU. Long visits in the environment studied is the basis for ethnographical studies (Hammersly & Atkinson, 1983) along with documentation of observed situated activities (Heath & Luff, 2000). Therefore, participant observation was conducted and field notes were compiled over a period of two years, in total 200 hours. The researcher who collected the data is a registered nurse and during the visits she was dressed as the ICU staff and followed the everyday work for about five hours a day in the mornings, afternoons and in the evenings. The participant observations were documented in field notes in conjunction with the activities studied or shortly thereafter because of the recommendation of writing down information as soon as possible (c.f. Agar, 1980; Hammersly & Atkinson, 1983). The field notes were unstructured in that there were no schedule or other aid used, but time, place, activities, what people said or did, who was participating and sometimes how people were positioned in the room was noted. The present study is built on field notes that encompassed staff members' communication about moral values.

ANALYSIS

The unit of analysis was the situated activities encompassing staff members working and talking to each other in everyday practice (c.f. Heath and Luff, 2000). The transcribed field notes were read and re-read several times in order to acquire an overview of the data material. This was done continuously during the field work (c.f. Agar, 1980; Pilhammar, 1996). One early observation was that topics of a moral character often were assessed in different situations. This early awareness influenced and directed the researchers' understanding of the data in later observations (c.f.

Goodwin & Goodwin, 1998). When analyzing the data the first author searched for interactions and activities where moral issues were at stake and tried to understand the meaning of this data in relation to the question asked. The findings were noted as key phrases in the margin and then related text segments were brought together (c.f. Polit & Hungler, 1999). From the data analysis four categories of topics of moral issues emerged and these findings were checked with the other authors to ensure reasonability. Disagreements were solved through discussion.

RESULTS

The four categories of topics of moral issues that the ICU staff talked about were: *Assessments of patients*, *Assessments of medical decisions*, *Assessments of other professionals' competence* and *Assessments of other institutions' activities*. To illuminate how moral values were negotiated in the ICU, the staff's reasoning in forms of excerpts from the field notes are shown in the presentation of each category.

Assessments of patients

When the evening shift started in the afternoon there was a gathering in the conference room at the ICU. One nurse from the morning shift gave a short report to the evening shift. This report could give the incoming shift of nurses an overview of the patients in the ICU:

"We have one vessel patient, one with a hip fracture, one who has been drinking illicit distilled spirits, one with an aortaaneurysm who has been bleeding; his trach (cannula for tracheostomi) has been changed."

The categorization of patients was drawing on the medical perspective and it was the medical diagnosis that is in focus in this brief piece of information. It was the medical diagnosis that seemed to be the relevant information and categorization in the reports between the ICU staff members. However, it was obvious that one of the patients was referred to as “one who has been drinking...”. Such inclusions can be interpreted as if it was the patient’s drinking habits that caused his registration as an ICU patient, and it could further be interpreted as if he was to blame for causing his own medical condition.

After the overview report, the registered nurses and the enrolled nurses, who worked together as a team, went to the white board and decided which registered nurse should take care of which patient. When this procedure was finished, the registered nurse who had previously taken care of the patient gave a report to the registered nurse and the enrolled nurses from the evening shift:

The first registered nurse says that the patient is an alcoholic who has been drinking illicit distilled liquor for four or five weeks. He came from the emergency because he has metabolic acidosis. He has been intubated and has been treated with a ventilator and a dialysis machine and he also has hepatitis C. The registered nurse from the afternoon shift asks if the first nurse thinks that the patient will stop drinking after this. The first registered nurse says that they must not have that kind of attitude.

The report started with what the reporting nurse meant is the cause of the patient’s medical condition; he had been drinking illicit distilled liquor for some weeks. Then the report focused on the medical condition.

The afternoon registered nurse asked if the first nurse thought the patient would stop drinking after this experience. She was focusing on the patient's drinking habit and she seemed to mean that now when he was so seriously ill he ought to stop drinking. However, the registered nurse who had been responsible for the care of the patient in the morning dismissed the attempt to discuss this issue. Instead she seemed to reprimand her colleague for raising the question. Her rebuke could be interpreted as if the question about the patient's future drinking habits was irrelevant now when he was given intensive care. It could also be interpreted as if the first registered nurse wanted to remind the other nurse to be professional.

In a report about another patient, whose ribs had been broken when he had fallen under the influence of alcohol, there was a different discussion:

In a report One of the registered nurses said that the patient had celebrated his birthday when he had harmed himself. Another nurse asks if the patient was drunk and the reporting nurse says: "It was his birthday, okay? But why he should climb over a fence, I do not know."

According to the first nurse it seemed as if the patient was excused for drinking too much when he had a reason such as celebrating his birthday. What she did not understand, however, was why the patient had to climb over a fence while being drunk. This could be interpreted as if she was defending the patient at the same time as trying to save her own face in front of the other registered nurse. It was okay to be drunk, but maybe not to climb over fences in such a condition.

The next situation shows how a registered nurse expressed her suspicion about an elderly woman's possible alcohol problem. The origin of the discussion was that the elderly woman with the diagnosis chronic obstructive lung disease (COL) had been confused and she had been shouting and cursing. An enrolled nurse tried to calm her down without success:

"I think she should have a drink and a cigarette," the registered nurse says with a meaning look to the anaesthesiologist. "Does she have that kind of problem?" the physician asks. "I don't know, but her husband has," is the nurse's answer. The anaesthesiologist says that he believes it is the lack of oxygen that causes the patient's uneasiness because those COL patients have breathing problems.

It seemed that the registered nurse knew the patient and her family. At least she had an opinion about the husband's drinking habits. The wife was consequently assessed in relation to his assumed behaviour. The anaesthetist took no notice of the registered nurse's insinuation. Instead it seemed as if he wanted to rebuke the registered nurse and teach her about the difficulties that COL patients can have, and he did this in a neutral way, without offending the registered nurse in front of other ICU staff members.

Assessment of medical decisions

In this ICU, operations on patients with aorta aneurysm frequently occurred. During the field study there was more than one of the patients operated on,

who had not displayed any symptoms at all. Often the aneurysm was discovered in connection with a health check-up:

The registered nurse reports that the patient, born in 1919, had an operation which lasted from 8.30 to 17.30. There were complications and he was re-operated on. He had been bleeding 14-15 litres of blood. The registered nurse, who had prepared the patient before the operation, said that the patient trusted the doctor's words that the operation would go well. "I took away a needle and he was bleeding a lot, so I got scared. There will not be any more operations on him." After the report, the nurses discuss the patient's situation. They are very upset. Someone says, "He could have lived for years". They continue to talk about the patient's family relations when someone says, "Ruby¹ and everything. Is that right?"

The nurses seemed to mean that the patient would have been better off without the operation. However, the physician and the patient had obviously believed the opposite. Before the operation, the patient had told the registered nurse that he trusted the doctor who had given the patient reason to believe the operation would go well. The ICU staff were not involved in the discussions about a possible operation. They met the patient the day before the operation and after it. They were worried whether the patient would live and get well or if there was a risk he would die or become "a vegetable" later on. They also said "the Ruby and everything", which could imply that they were uncertain whether or not he had a chance to live a decent life after the operation. It seemed as if they wondered if technology may have made his situation worse.

¹ Ruby is the name of the dialysis machine.

Another discussion about medical decisions took place in the Square, a central place in the intensive care ward. This time the moral dilemma concerned the treatment of patients with COL. It was the anaesthetist who talked to two registered nurses and one enrolled nurse:

The anaesthesiologist means that the COL patients get a very difficult situation when they no longer have the breathing help that the ICU can offer. They have not been that "well ventilated" for a long time, and when they have to adapt to their high CO₂ again they feel the lack of oxygen and their situation becomes troublesome. The anaesthesiologist asks, "Is this really right?"

This sequence could be interpreted as if this physician questioned other physicians' medical decisions and that their previous decisions had put the patient in her present condition. It seemed as if he was uncertain to use technology because the patients can be harmed in the long run.

Assessment of other professionals' competence

It was rather common that ICU staff members criticized other professionals, but mostly not directly to the person in charge:

One of the registered nurses in "the Square", where the oscilloscopes with each patient's electrocardiogram are displayed, says, "What is the matter with the patient in the four-room?" "The physicians are dealing with him," another registered nurse says as she is coming out from the patient room. "He [the patient] becomes so distressed. I can't understand why they do not give him something sedating. They do not understand that it is a human being that they are dealing with."

On the oscilloscope, which could be seen as an open tool as everyone in the “Square” can follow the patients’ electrocardiogram, the nurses could see that one patient’s pulse and blood pressure had increased. The registered nurse who had come from the patient room was upset by the physicians’ insensitivity. It seemed that she would have liked to teach the physicians how they ought to treat patients. She acted as the patient’s advocate, but she did not express her point of view to the physicians.

In another situation, the following sequence took place:

Two enrolled nurses meet. One of them asks, “Do you think that the night shift cleans up the kitchen? I have cleaned the microwave. It was very dirty. The other nurse answers, “I don’t know, but I agree”.

This excerpt shows a cleanliness dilemma between those who worked at the day shift versus the night shift. The day shift staff accused those of the night shift for not having done what they were supposed to do. One enrolled nurse took a superior position against the personnel on the night shift when claiming that they were not clean and that she had to clean up after them. She was supported by the other enrolled nurse and together they had a secret alignment against the night shift. This could be interpreted as a way of creating a feeling of us and them.

In another situation, an anaesthetist told a colleague about his experience during an operation:

“The surgeon released the clamp. The blood pressure went down, and I asked, what is this? We released the clamp, somebody says. Why can they not tell us five minutes ahead what they are going to do?” The other anaesthetist agreed.

The anaesthetist referred to a situation where he had been responsible for a patient on the operation table. He was upset by the fact that he had not been informed of the surgeon's actions with the patient. This in turn had made it impossible for him to keep the patient's blood pressure steady. He related this experience to a colleague who seemed to understand the problem. This could be interpreted as if this lack of communication between surgeons and anaesthetists can constitute a risk for the patients' medical condition.

Assessment of other institutions' activities

A phenomenon which was frequently discussed in the ICU during the time of this study was what the ICU staff called the "tiny operation schedule". This meant that the ICU staff were upset by the small number of patients operated on. Mostly, it was the registered nurses who talked about it in different ways:

One nurse asks the other if she wants to see the operation schedule for the next day. She looks at it and says, "Nice!" In another situation when the operation schedule is discussed a registered nurse says, "Why do they make such an operation schedule? It is not strange that there are such long operation queues."

One of the registered nurses also talked about how long her mother had been waiting for an operation, and she meant that there must be a connection between the "tiny" operation schedules and the long operation queue. The discussions often landed in criticism of the politicians, which also was the case when the ICU staff talked about the organization of the

health care system on the whole. In the following excerpt, it is shown how they talked about a patient, who the nurses thought had gotten into trouble because of the insufficient staffing in the health care organization:

"He is going directly to hospital X. He came as a wound revision, but it ended in amputation so now he is more an orthopaedic than a vessel patient. It is terrible how the politicians get the patients into a jam."

The politicians had decided that the different special clinics should be divided between different hospitals in the region and that was why the patients were transported between them. When they talked about the patient, they labelled him a vessel and an orthopaedic patient in accordance with the institutional categorization which mostly referred to the patient's diagnosis. In spite of having categorized him from a medical perspective, the nurses expressed empathy for him when accusing the organisation for causing him inconvenient transportations between the different hospitals. The registered nurses expressed that they were anxious about the patient's well-being.

The ICU staff also accused other institutions of unreliable behaviour, for example, the regional wash company. One evening, when staff members and patients were watching television, there was a segment on the news which discussed the regional washes and the so-called scrap funds. The scrap fund consists of belongings the health care staff have forgotten to remove from their pockets. One member of the ICU staff told the following story about the regional wash cleaning the hospital staff's clothes:

"One enrolled nurse once called the ICU after coming home from her shift. She suddenly had remembered that she had forgotten a

five crown coin in the pocket of her uniform which she had put in the wash sack. She asked if someone could go out and pick it up 'so they do not take it in town Y' [where the wash resides]. We all laughed."

The negative perception of the personnel in the wash firm implied dissociation with them. They were not to be trusted even if it was the staff at the ICU who had been careless. It seemed that the ICU staff begrudged the wash staff to get their things.

DISCUSSION

Our findings show that the patients' lifestyle, mostly in connection to their use of alcohol, was a recurring moral topic. There were different attitudes towards the use of alcohol depending on how and when it was used. To have too much to drink on your birthday seemed to be acceptable if you did not as a consequence harm yourself. Drinking alcohol for weeks which leads to un-health, or having a husband assessed as a drunkard caused condemnation of the personality. Patients assessed with unacceptable habits were even made fun of in an ironic manner, as was the case with the confused elderly woman when the registered nurse expressed that the patient would benefit from having a "drink and a cigarette". In this case, the anaesthetist mitigated the nurse's attitude focusing on the patient's situation from a medical perspective. It seemed as if he wanted to help the registered nurse to "save face" (c.f. Goffman, 1981) in front of the other staff members, as the anaesthetist expressed himself in a neutral way.

The examples above illustrate that (ill)health and disease can constitute an assessment of aspects such as a person's power of initiative, adaptability and will

power or a result of an individual's moral qualities (Greco, 1993). Crawford (1977) labels attitudes such as these as the victim blaming perspective. Judgements about personal lifestyle are frequently occurring in medical contexts (Linell & Bredmar, 1996). We assess ourselves and others as competent actors, capable and responsible for our choices and actions. This means that non-acceptable behaviour is understood as a result of bad choices (Bergmann, 1998) and that the person could have chosen a better way of living. How such an attitude is rooted depends on the negotiation with others (Linell & Rommetveit, 1998; Shotter 2000). Moral dilemmas such as these can be seen as negotiated in concert, but often in a hierarchical way (Thelander, 2000).

Another topic of moral issues arose when staff members assessed medical decisions made by physicians. The registered and enrolled nurses expressed the opinion that the patient's bad condition was due to the fact that he had gone through an unnecessary operation. The staff members' attitude was discussed with others who were not involved in the criticized behaviour and whom they seemed to trust and thought would confirm their experiences. It seemed as if they felt sorry for the patient and had to blame somebody. It is not uncommon for ICU staff to criticize other staff members' competence secretly (c.f. Thelander, 2001). Such secret agreements can be understood as a way to strengthen their fellowship; "we and them" (Goffman, 1959). However, in this study registered nurses seldom initiated direct criticism of and to physicians (c.f. Oberle & Hughes, 2001; Svantesson, Sjökvist & Thorsén, 2003). If direct criticism was made, it seemed to be more appropriate to criticize staff members of lower rank. (c.f. Thelander, 2001). The nightshift seemed to be treated in a similar way compared to the dayshift. For example, one of the enrolled nurses on the day shift insinuated to a colleague that staff from the night shift did not clean the kitchen sufficiently enough, and the other enrolled nurse agreed with that statement.

The moral assessments made were not just directed against other people inside the ICU. The health care organisation was also blamed. Almost every day, the ICU staff discussed how the patients were squeezed in the system because of incorrect political decisions. The patients had to wait too long for operations and they were “wheeled” around because of the insufficient organisation. Modern society has experienced a development towards rationalisation, which in turn may influence how moral values seem irrelevant to the bureaucratic system (Bergman, 1998). The health care workers have a commitment to care for patients and preserve and maintain moral values irrespective of political rationalizations. The moral expressions about bureaucratic intentions could, hence, be understood based on the fact that such intentions contradict caring values.

It is through communication and dialogue that moral values become visible (Linell & Rommetveit, 1998). When different staff members interact in an ICU, they negotiate how to understand the patients, other members and the organisation. From a socio-cultural perspective, it is not only their cognitive skills or talents that are crucial for their assessments (Säljö, 2001). Instead, it is their communication with others that creates an understanding of moral values, which in turn influences how they make sense of their everyday practice. In addition, the construction of meaning depends on one’s professional and contextual knowledge, as well as the individual position of those involved in the communication.

METHODOLOGICAL CONSIDERATIONS

Observation brings the researcher close to the research field, even if the activities have to be understood from an outsider's perspective. Further, new activities go on while documenting previous actions. It is crucial for researchers to be aware of biases that can influence the understanding of activities. On the other hand, such biases always exist in research (Hammersly & Atkinson, 1983). The observer in this study has extensive experience from nursing in intensive care. Such experience can obscure the perception of what goes on in the discourse, but it can also be a resource for the researcher, since seeing always is connected to cultural knowing (Goodwin & Goodwin, 1998). In order to test credibility, the interpretation of the data has been checked between all the authors until consensus was reached. Trustworthiness of the results is also assured by the presentation of excerpts from the field notes when describing the findings.

CONCLUSIONS

Moral matters are embedded and entwined in the ICU staff's everyday practices. However, we cannot say if the staff are aware of their involvement in moral discourse and how their negotiations about moral values influence the care given. The moral discussions about other staff members take place in secret when whoever is talked about has a higher position in the hierarchy. There is a risk however, that unreflecting and invisible moral values influence the care given in a negative way. With increased reflections and knowledge about each other's perspective and working conditions such negotiations may increase the opportunity to make unbiased decisions and give unbiased care.

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