Vigilance & Invisibility

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Abstract

This thesis focuses on the relationship between technology and caring in technologically intense environments. The overall aim was to uncover the meaning of care in those environments as experienced by patients and caregivers. Moreover, the study aimed at finding a deeper understanding for the almost total dominance of technology in care in intensive care.

The thesis includes three empirical studies and one theoretical, philosophical study. The research was guided by a phenomenological and lifeworld theoretical approach. Research data consist of quantitative parameters and qualitative interviews with caregivers and patients. Data was analysed and synthesised with aim of seeking meaning through openness, sensitivity and a reflective attitude. The goal was to reach the general structure of the phenomenon and its meaning constituents.

The result shows that an intensive care unit is a cognitive and emotionally complex environment where caregivers are juggling a precarious handful of cards. Despite being constantly monitored and observed, intensive care patients express that they feel invisible. The patient and the apparatus easily meld into a unit, one item to be regulated and read. From the patients' perspective, caregivers demonstrate keen vigilance over technological devices and measured parameters, but pay scant attention to their stories and experiences. Technology, with its exciting captive lure and challenging character, seduces the caregivers and lulls them into a fictive sense of security and safety. Technical tasks take precedence or have more urgency than caring behaviour.

A malaise settles on caregivers as they strive for garnering the security that technology promises. Yet simultaneously, insecurity creeps in as they read the patient's biological data. Technical tasks take precedence over and seemingly are more urgent than showing care. Listening, inspiring trust, and promoting confidence no longer have high priority. Trying to communicate 'through' technology is so complex, that it is a difficult challenge to keep in perspective what or who is the focus; 'seeing' or caring. Technology should be like a catalyst; do its 'thing' and withdraw 'unnoticed'.

This thesis has contributed in gaining deeper knowledge about care in technologically intense environments and the impact of technology. The main contribution is that caregivers need to be aware that the roar of technology silences the subtle attempts of the critically ill or injured person to give voice to his or her needs. In conclusion, the challenges for caregivers are to distinguish when to heighten the importance of the objective and measurable dimensions provided by technology and when to reduce their importance. In order to magnify the patients' lived experiences. It is a question of balancing state-of-the-art technology with integrative and comprehensive care, of harmonizing the demands of subjectivity with objective signs.

Key words: caregivers, caring, caring relationship, critical illness, intensive care, nursing, patient perspective, phenomenology, technology

And now here is my secret, a very simple secret;
it is only with the heart that one can see rightly;
what is essential is invisible to the eye.
(Antoine de Saint-Exupéry)

ORIGINAL ARTICLES

This thesis is based upon the following papers, which will be referred to in the text by their Roman numerals:

I. Almerud, S. & Petersson, K. (2003). Music therapy – a complementary treatment for mechanically ventilated intensive care patients. *Intensive and Critical Care Nursing.* 19: 21-30.

II. Almerud, S., Alapack, R. J., Fridlund, B. & Ekebergh, M. (2007). Of vigilance and invisibility - Being a patient in technologically intense environments. *Nursing in Critical Care.* 12(3): 151-158.

III. Almerud, S., Alapack, R. J., Fridlund, B. & Ekebergh, M. (2007). Caught in an artificial split – A phenomenological study of being a caregiver in the technologically intense environment. *Intensive and Critical Care Nursing.* (In press).

IV. Almerud, S., Alapack, R. J., Fridlund, B. & Ekebergh, M. Beleaguered by technology - Care in technologically intense environments. (Submitted).

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INTRODUCTION

Until the radical revolutionary vision of the 1960s, the medical model cruises as an unchallenged lead vehicle along the highways and byways of Western culture. The Age of Aquarius, however, punctures its tires. In the 1960s, grievances mount against the high-tech, big business orientation that had turned the human sufferer into to a 'client' and 'consumer'. By the mid-1970s, critical thinkers and doers attempt to strip the wheels off the medical model completely (c f Illich, 2002; Sontag, 1991; Cousins, 1979). Thus, in our millennium, we inherit a legacy of divisive value judgments. How do we juggle the seemingly impossible dualism: commitment to medical technology versus commitment to individualized personal care? It is precisely this quandary that the data of this study addresses.

During the past several decades, concerted efforts to develop equipment and procedures have made the modern intensive care unit (ICU) the hospital's most technologically advanced environment. The question arises: in terms of patient care, are these advances unmitigated gains? More specifically, this thesis probes the meaning of care of critically ill or injured in such a technologically intense environment.

Western medicine arguably takes better care of physiological damage to the human organism than in any time in human history. Technological advances help build that claim. We both need and want what technology can generate. Equipment is indispensable to the art and science of medical care. With the best of intentions, nevertheless, things can go awry.

The patient's credibility is called into question by the Cartesian quest to determine whether the symptoms are 'real' and if they actually reside in the body and not in the mind. From the caring perspective any symptom must be both heard and attended to in its own right. Not just as evidence for an accurate diagnosis (Benner, 2001). The fact that a disease is explainable in biomedical terms does not necessarily mean that it is understandable, or 'liveable', from within the individual's lifeworld and lived body. Explanations as well as understanding are required for adequate treatment of the embodied person within his or her particular lifeworld (ibid).

Sickness belongs to a context. Every patient brings to the sickroom his past and his expectations of the future (van den Berg, 1972). Within health care, the desire to heal seeks incessantly material and pragmatic ways and means to realize its goals. But there is always the remainder: the need for the human touch. Appropriate examination of the influence of technology on nursing and patient care is made best through considered reflection on all ways, means and

human comportment that comprise the total environment, rather than specific machinery or equipment (Barnard, 2002).

Already in 1994, Gjengedal articulated the difference between caring and technical competence. She claimed that ICU nurses spend too much time on technical activities which are not considered as caring, but that this tendency was changing.

Theoretical perspective

A paradigm shift is taking place in many disciplines such as health care, pinching for conceptual space in the scientific reductionistic view of nursing and caring (Timmins, 2002).

Caring sciences have grown from within the nursing profession under and in the shadows of medicine. Effects have been noticeable, both in nursing activities and in research (Dahlberg, Drew & Nyström, 2001). Nursing and caring science in the 21st century is about searching for new meaning and understanding of care (Timmins, 2002). The focus of caring science is the patients' existential phenomena, the meanings of these phenomena and their significance for health. Research concerning the caring encounter is also included in this field.

The standpoint for caring science should be the patients' own experience of their life situation, health, suffering, wellbeing and care. These are phenomena that do not exist concretely and cannot be captured by techniques that reduce everything to measurement. Instead, the lifeworld approach assumes concrete form when the caregiver shows interest in the patient's story (Dahlberg et al, 2001). Focus on the patient grants maximal respect to the person as the true expert on himself and his situation. Integrity is the value base that promotes compassion, honesty, presence and the assurance of good care. As has been said earlier, this perspective can include the caregivers' points of view. But the caregivers' perspective rebounds always off the patients' situation. Medical concepts would have no bearing if they were not contextualized, e g, within the context of intensive care (Dahlberg, Segesten, Nyström, Suserud & Fagerberg, 2003).

BACKGROUND

History

of medicine

Medical interventions tend to escalate in the absence of everyday care. Modern medicine has separated the social from the physical, thus focusing upon diseases that can be treated or cured with biomedical interventions. But medicine can only accomplish its work if the world-sustaining care structures are reasonably intact. The lifeworld always has the privilege. Health care provides expensive treatments with little attention given to care structures that may sustain and/or prevent the need for medical treatment (Benner, 2001).

      Since the 19th century, when medicine aligned itself with the natural sciences, physicians have moved through a series of stages: from direct communication with the patients, based upon verbal techniques to communication with their patients' bodies through techniques of physical examination, to communication with the bodies of their patients through machines and technical experts (Gjengedal, 1994).

      Foucault (1989) writes the archaeology of the medical gaze. During the hey-days of the 19th century, medicine honed a way of looking and investigating that 'carves up' the seen and the said. Instead of saying "What is the matter with you?" as would the 18th century physician to the suffering person, the 'new' positivist doctor asks, "Where does it hurt?" (ibid). That seemingly trivial question switch vision; it changes everything. One of the consequences is the change of focus from the patient to his symptoms. This, in turn, reduces the total perspective.

      Modern medicine focuses on pathological processes. Organ failure and abnormalities tend to take up the health care providers' attention at the price of understanding the patient's reactions to her/his illness. Before the development of high technological diagnostic equipment, the physician's diagnosis depended upon the patients' stories (Johannisson, 2004).

      Sickness and disability violate a person's existence, shrinking the horizons of daily life possibilities. An exclusive projection the medical gaze onto lifeworld concerns and human suffering runs the risk of disrupting integrated, holistic care. As soon as the medical discourse becomes totalized, the healing and human possibilities are effectively shut down (Benner, 2001). Modern medi-

cine must learn to do more than apply biological facts to particular cases. The art of healing requires a discriminating regard for the human being as a whole, rather than the technical application of separate bits of technical data to human lives, disrupted by debilitating illness (Gadamer, 1996).

of technological tools

Heidegger wrested thought away from its home in theoretical abstraction, namely from Plato's rationalistic dualism, and put us in our body, in time and on this earth. To draw us along through the 'care-structure' of existential categories, he starts with the tool, with equipment (Heidegger, 1962). He suggests that there are several ways of pragmatically relating to our world, for instance, 'ready-to-hand' and 'present-at-hand'. Ready-to-hand is an engaged, ordinary, everyday relationship with our world and is our fundamental way of interacting with our world. The ready-to-hand perspective is concerned with seeing and understanding the world as something practical to use. In this view, the world exists as a context of meaningful activities. This is referred to as 'circumspection', which requires an involvement with the world enabling things to exist as ready-to-hand in a unitary frame of reference. Technology, existing as ready-to-hand, becomes phenomenologically transparent because it becomes embodied in practical activity. The peculiarity of the proximally ready-to-hand is that it must, as it were, withdraw in order to be ready-to-hand quite authentically (ibid). Heidegger (1962) further identifies different ways in which technology can become present-at-hand, rendering technology unusable or phenomenologically opaque. Technology becomes conspicuous when it cannot be used for its intended purpose, for instance when it malfunctions. Furthermore, technology becomes obtrusive when pieces are missing and it can therefore obstruct our intentions by standing in our way (ibid). Simply put, we should first and foremost see the person, the patient, not the tool.

Medical technology has made tremendous progress in the last few decades and technological progress continues at an increasing speed. Developments in conventional monitoring have concentrated on improvements in signal processing, monitors and dependability (Gjengedal, 1994). A stethoscope is what it is physically, but also what it becomes in a specific user context. Among other things, the stethoscope is an instrument of diagnosis, an extension of the ear, a symbol of both science and a higher status (Sandelowski 2000). It also is a tool which makes it possible for staff members to count the pulse rate without having to touch the human body (Wikström, 2003). With the gain, comes a loss. It suits to elaborate.

The development of technology and technological tools in our society has emerged at a rapid pace since the Second World War, which, in turn, is resulting in a complex society with a high degree of division of labour. 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 (Wikström, 2007). The development and handling of new technological tools make the environment more complex and transforms the character of the ICU staff's everyday work. There has been a tremendous growth

in different technological tools used in the ICU. Almost all the technological tools are digital and in some way replace human activities, i e, a tool performs activities usually carried out by caregivers before that tool was developed. Human knowing has thus been transferred to the machines (ibid). Decades of tremendous progress in medical technology continues unabated.

The ICU, a technologically intense environment

Sophisticated tools for coping with critically and seriously ill conditions, such as monitoring devices, an array of signal processors and reliable assessment displays, makes the ICU the most technologically advanced and the most technologically intense environment in a hospital (Wikström, 2003; 2007; Lindahl, 2005). A modern ICU is designed to accommodate seriously ill patients whose condition may be life threatening or manifest insufficiency of vital organ functions. Consequently, those units usually have a wide variety of sophisticated monitoring devices that allow continuous assessment of vital body functions (Lindahl, 2005; Johansson, 2006). In ICU, staff members, the serious ill patients and their relatives are surrounded by technological tools in a high-technology environment (Wikström, 2003). Walk in one room and gaze. Even if you were blind, you would hear the machines so prominently there.

ICU milieu

Efficient treatment is the goal of the hospital. Everything from fittings to architecture serves this pragmatic purpose. More than most, patients admitted to the ICU encounter this over-arching concern with efficiency. Since they suffer from a wide range of different and death-threatening disorders, intensive care practice concerns first and foremost the restoration and maintenance of disordered physiology (Gjengedal, 1994; Wikström, 2007). While questioning and criticising technology, we never lose sight of a basic reality: You must save the individual's life before you can talk to her about her experience of pain and suffering.

Staff members follow special rules, have special tasks and use extraordinary equipment. The tremendous progress made in medical technology has created an even more complex environment with ever more sophisticated technological tools. The caregiver must learn to handle and master them. Likewise, the development and introduction of different drugs carries the demand that the caregiver monitor incessantly their impact upon the patients' vital functions (Wikström & Sätterlund Larsson, 2003; 2004). Nothing in the hospital or ICU, however, caters to the human reality that the institution should 'host' people admitted with their grave medical conditions. Does not the root meaning of the Greek word 'hospes' - stranger-guest-friend - signify that the hospital milieu should also welcome those who must spend time there?

Being patient in ICU

Hupcey (2000) found that feeling safe was the overarching need of ICU patients. By its very nature, the ICU environment is stressful. Not surprisingly, research has focused on factors that create or contribute to the ICU patient's stress. The most frequently investigated variables include continuously high noise level, lack of sleep, enforced immobility, social isolation and communication problems (Granberg Axèll 2001; Alasad & Ahmad 2005). Frustration of being unable to speak, fear and anxiety connected with the actual illness are other sources of displeasure. Thirst, inability to relax and go to sleep, confusion, dyspnoea and difficulty to communicate are also cited as other, often occurring unpleasant feelings and experiences for the respirator-treated patient (Bergbom-Engberg 1989; Granberg Axèll, 2001). Treatment in ICU involves many and constant medical tests and observations plus a host of procedures. Furthermore, the environment is one of technical apparatus, machinery and frequent medical testing. As a result it can be difficult for the patient to relax. To be seriously ill and confined in strange surroundings is bewildering and even frightening. Fatigue and confusion ensue (Bergbom-Engberg 1989; Granberg Axèll, 2001; Lindahl, 2005; Samuelson, 2006). The many routines and procedures compromise self control and generate threat. ICU patients are sensitive, vulnerable and overwhelmed with a sense of fright and excitement. The ICU nurse must therefore plan and implement treatment with both caution and care (Granberg Axèll 2001). Gjengedal (1994) points out that a situation which health care providers regard as ordinary may be extraordinary experiences to their patients. A proportion of ICU patients suffer from intensive care syndrome (ICU syndrome) which is characterised by perceptible disturbance. This can often lead to sight and hearing hallucinations, aggression, confusion and paranoia. The cause of ICU syndrome is unknown but it is likely that several factors contribute. Precipitating factors can be the illness or injury in itself compounded by patho-physiological disturbance, the very acts of medical treatment, the unfamiliar environment or the normal routines and procedures on the unit. Pain-killing drugs and tranquilizers can contribute further to the ability to interpret stimuli (Granberg Axèll 2001; Samuelson, 2006). In spite of the patients' lack of control and stressful experiences, they describe feelings of value and motivation in secure surroundings. Most mention their will to fight for survival and recovery (Wåhlin, Ek & Idwall, 2006).

To care in ICU

The nursing profession has been strongly influenced by the development of medicine with the consequence that nurses seem to be forced to serve two 'masters' whose ideologies are not always easy to combine. This phenomenon is perhaps more visible in high technology units (Gjengedal, 1994). The biological body is 'carved up' as an object of observation, supervision, review and control. Like so many letters of the alphabet, they isolated observations of pulse, temperature, blood-count, etc. (Foucault, 1989). Contradictory imperative demands lead to stress in ICU (Cronqvist, Theorell, Burns & Lützén, 2001). A nurse's ability to read a situation, her sensitivity to how the patient looks and responds to

the treatment, and her readiness to change treatment or shift priorities is an aspect of having control (ibid). Such awareness traditionally has co-defined a proficient nurse (Benner, Tanner & Chelsea, 1996). Nowadays, the ability to manage the technology has emerged as a main component that co-defines competent critical care nursing. This management ability must be gained also mainly through experience.

The effect of machinery management on patient care is seen as part of everyday routine in the setting (Alasad, 2002). Sometimes under difficult conditions, the ICU caregiver not only has to know the best evidence-based practice and be able to use it, but also identify patients' responses, make clinical judgements and take any action necessary. This must often be done simultaneously while ensuring that several support systems for vital functions will continue to be effective (Ashworth, 2000). Lindahl & Sandman (1998) describe the role of advocacy in ICU as a role to build a caring relationship, to commit, to empower and to create a trusting atmosphere with recovery as a goal. The meaning of the role of advocacy is a moral and existential response to another human being, an expression of caring. The advocacy rests on the patient-caregiver relationship and occurs as an outspoken demand of another human being whose autonomy is threatened (ibid).

Nurses and physicians alike receive specialized, advanced technical training so that they might monitor the patient's condition and immediately make optimally informed clinical decisions. Likewise, they must monitor the impact of the latest developed drugs upon vital functions. Technology is incorporated in the care of the patients and intensive care is, to a great extent, dependent on its technology (Gjengedal, 1994; Wikström, 2003; 2007). Nurses are trained and socialized to seize technical details using a powerful clinical glance (Nyström, Dahlberg & Carlsson, 2003). However, the glance is silent, like a pointing finger (Foucault, 1989).

Those referred to as 'caregivers' in this thesis are the persons who are directly involved in the care of the patients, i e, enrolled nurses, registered nurses and physicians.

Technology as an actor in ICU

The Code of Ethics for Nurses (ICN, 2006, p 3) states: "The nurse, in providing care, ensures that use of technology and scientific advances are compatible with the safety, dignity and rights of people". Technology is an ever-present actor in ICU. It both supports and challenges staff members. It challenges the ICU staffs' practical knowledge gained from experience. Knowledge-in-practice, such as 'seeing' whether the patient was well saturated with oxygen by observing the colour of his skin, is now delegated to the oxymeter. Accordingly, one could say that the ICU is not only a technically but also a cognitively intensive environment. The technological tools do not work by themselves; skilled people operate them. Humans and tools are thus interwoven. The tool in itself is of no interest; it is the interaction and communication between staff and tools that is interesting (Wikström, 2003). However, few studies concerning communication with ICU

patients have been published. None focusing on communication in relation to technology could be found. The studies that have been conducted have focused on practical problems with communication and lack of caregiver's knowledge. They have suggested tools, strategies and given recommendations of actions to ease the necessity of communication. Still, in spite of lack in the research, communication with critically ill patients is important for their well-being (Alasad & Ahmad, 2005; Magnus & Turkington, 2006). Insofar as technology too often dominates, it is a complicated balancing act to utilize it without compromising care.

Technology, however, is not necessarily opposed to humanized care (Barnard & Sandelowski, 2001). Recent scholarship suggests that technology should be understood as depending on the eye of the beholder, the hand of the user, and the technological systems that influence integration. Are important human values, like concern and respect for individual human beings, being sacrificed in favour of technical efficiency when choices have to be made? Nurses have charged medical technology with the dehumanization and depersonalization of patients and of nursing care, with creating the alienation between self and body, and with separating nurses from their mission to care (ibid).

The concept of technology

Technology is a word of obvious meaning that nonetheless engenders confusion. And often it is used to promote an aura of professionalism. Technology embodies our desire to influence the world around us. The task of understanding technology within nursing care is both important and challenging due to its ubiquitous nature. Technology is ubiquitous, yet we are not always aware of it. It is appropriate, that we examine the philosophies of technology and caring, and focus on the domain of inquiry that addresses the implications of the interface between care and technology (Barnard, 2002).

The original Greek term for existents, for the things that are, is physis. The word denotes "the process of a-rising," the "self-blossoming emergence" of being, its power to endure. Poesis expresses the same, only designates that someone with skill or art brought forth something from hidden-ness, unfolded it. Originally techne (technique) signifies the ability to plan and organize freely, creating, building and producing (Heidegger, 1959, p 16). Terms like craft, cunning, knack, and flair capture this original sense of technique. In terms of nursing care, the creative act would be to re-forge the broken bond between techne and poesis. Double vision.

Technology we have always had with us; perennially humankind has struggled to situate machines and technical gadgets within the larger space of existential and spiritual possibilities. Likewise within health care, the ache to heal seeks incessantly practical-material ways and means to realize its goal. Heidegger (1993) is clear. Technology and the essence of technology (which he names Gestell) are not equivalent. And "the essence of technology is by no means anything technological" (ibid, p 311). Technology is both "a means to an end" and "a human activity". The two belong together (ibid, p 312). Heidegger expresses the pitfalls to lucid thinking about the essence of technology if we "affirm or

deny" it, "merely represent and pursue" it, "put up with, or evade it" or - worst of all - "if we regard it as something neutral" (pp 311-312). Heidegger's rich word for the essence of technology, Gestell, carries the senses of being framed, set up, or duped. It connotes sterility, mendacity, concealed matters, or obscurity. It suggests scaffold, and gimmick. The technological attitude blurs Being's radiance, renders it empty and tawdry. Under the domination of Gestell, all beings whatsoever are disclosed as stock or resource: objective, calculable, quantifiable, profitable or disposable. The values of profit and of efficiency for efficiency's sake sabotage what by vocation we should shelter and safeguard (Heidegger, 1993).

Reiterating Heidegger's critique of the increasing mechanization of the modern world, Gadamer (1996) contradicts the claims of modern technical practices that seek to objectify, master and control the natural world. When medicine founds itself on a scientific world view, it seeks to master illness, often forgetting that restoring good health is less a matter of constructing something new than of restoring a previously taken-for-granted balance, equilibrium. The art of healing is essentially an ability to reproduce and re-establish the health of an ill person. Gadamer considers modern medicine's progressive reliance on technology as mechanical rather than an art of healing (ibid).

A phenomenological perspective of technology

Technology put man in a position to control nature, but we are not always aware of what implications such power has on human life. Although technology may in some limited area clearly represent progress, it narrows our perspective. Therefore it can prevent us from seeing the totality, and make us more 'short sighted'. One of the consequences may be a change of focus from the patient to his symptoms (Gjengedal, 1994). At the same time as the complexity increases, the medical perspective seems to become narrower due to increased specialization. This is the inevitable price we have to pay for the development. Technology does not necessarily serve its original aim, but in spite of that, it seems difficult to remove technology that is already in use (ibid).

The lived body and technology

Within the phenomenological perspective, the lived body is central. Humans access life through the body. As long as we live, we do it in and through our bodies (Merleau-Ponty, 1995; Toombs, 1992). This means that every bodily change creates a change in the access to life. A change of this ilk becomes obvious when we get ill. The human body can not be considered as only a thing, an object. Instead Merleau-Ponty (1995) states that the body is also to be perceived as lived, as a subject. The subjective body is filled with memories, experiences and wisdom. One does not only have a body, one is one's body. One is both subject and object to self and a self that is an object for the other.

Medical science shares the dualistic bias of western rationalism, as well as the resultant atomism, reductionism and the Darwinian based biologism. Is it possible for the caring science to stay aligned with medicine and still eschew its dualism? Stated positively, can it espouse a thorough-going holism instead of being plagued with the splintering initiated by Plato, etched in granite by Descartes and adopted by the natural sciences? Knowledge about the biological body is vital, but the standpoint for caring sciences biology is lived, i e, the understanding of the subjective body goes beyond the biological perspective (Dahlberg et al, 2001).

Extending Husserl's account of the lived body (as opposed to the physical body), Merleau-Ponty resists the traditional Cartesian separation of mind and body. My body is, as it were, me in my engaged action with the things I perceive, including other people. The body is a lived whole, which cannot be understood in separate parts. The body is intertwined with the world. Constantly present in our everyday lives it is 'the anchorage' to the world since this lived body is the medium of access to the world (ibid). Physicality or corporeality connects us to the world and other people (Ihde, 2002).

Ihde (2002) explores the meaning of bodies in technology, how the sense of our bodies and our orientation in the world is affected by various form of technologies. Between humans and technology a figure-background relation forms. It is optimal when technologies recede into the inconspicuous normalcy of daily life.

Caring and technology

From one angle, this entire work continually probes the complex and tricky issue of the relationship between caring and technology. Herein the reality of the suffering human being holds centre stage. How to intervene in the face of illness and pain? That is the question. Artificial polarities abound that divide human care and technology. This work eschews any and all dualisms as both arbitrarily false, mere abstractions, and counter-therapeutic. Thus, Heidegger's distinction is paramount. It is trite to bless or blame technology. Technology and care belong together. Gestell, the essential attitude of technology, confounds the matter of care. The ensuing descriptions about technology and caring should be read in that light. I am trying to halt the never-ending dualism.

Appropriate examination of the influence of technology in patient care is made best through considered reflection on all the means used in an environment, rather than specific machinery or equipment (Barnard, 2002). The caregiver's role is unique and machinery can never substitute for it. The caregiver should treat machinery as useful tools and not as a replacement for her art (Gjengedal, 1994). A caring attitude can be interpreted as a personal characteristic, and nursing perceived as an extension of medicine, involving technical skills and a willingness to assist the physicians. As a consequence, the nurses do not think of their patients as unique human beings whose wholeness is manifested in thoughts, feelings and attitudes (Nyström et al, 2003). To be human is to reside in a particular world of embodied capacities, concerns and relationships. Without

this situatedness in a lifeworld, a person loses the ability to feel at home in the world (Benner, 2001).

What is the role of the caregiver? How are technological activities related to thought? There can be an associated feeling of making a bitter sweet choice between two actions, which has no strict objective principle except that they are the reality of caring (Barnard, 2002). For example, does one fix an intravenous infusion pump instead of spending time with a patient, or leave a patient to answer a telephone? Introducing new or updated technological objects into clinical practice places renewed demands on clinical skills, knowledge and time. Machines will make the caregiver feel safe and in control. Getting experienced, the attention will shift to be focused on the patient rather than the machines (Alasad, 2002). The nurse learns to cope. Nevertheless, technical activities are seen as more important and stimulating than other nursing activities (ibid).

The power of decision-making has been delegated to technique and we have relied on technique for the development of professional status. Nurses have expressed concern over the impact of technology, but have embraced technique. Yet, it is technique that has made contemporary nursing 'technological', not objects, machines or equipment. Appropriate examination of the influence of technology on nursing and patient care is made best through considered reflection on all the means used in an environment, rather than specific machinery (Barnard, 2002). The problem of technology for the caregiver abides in the choices we and our patients make about what is humane, and dignified care (Barnard & Sandelowski, 2001). Surely, whatever a caregiver does should be imbued with a caring touch (Johns, 2005).

Nurses are positioned at an axis point between technology, individuals, clinical environments and communities and have a responsibility to take a primary role in interpreting and influencing the relationship(s) between technology, health care praxis and human experience (Barnard, 2002). Accordingly, emphasizing the difference between touch and technology puts the spotlight on differences that either do not exist, or do not matter, instead of diverting ourselves away from differences that do. A question that we must answer is whether the discourse of difference surrounding technology is preventing us from recognizing the way Gestell, the essence of technology, can undermine humane care (Barnard & Sandelowski, 2001).

Humanities philosophy of technology

Humanities philosophy of technology interprets technology as not only what we do, but in relation to how the world is experienced by individuals, groups and cultures. Humanities philosophy of technology aims at further insight into the meaning of technology and its relationship to the world (Barnard, 2002). To understand the meaning of technology, we have to be aware of how it functions, how to use it. And to fully understand technology, we have to understand it in relation to human beings and to their society. Technology put man in a position to

control nature, but we are not always aware of what implications such power has on human life. How do man and technology shape each other (Gjengedal, 1994)?

The question of dichotomy

To be clear, there is no real dichotomy between technology and caring. Earlier research in the area of intensive care has mostly focused on what some researchers call the tension between technology and care in the ICU. Researchers have claimed there is a dichotomy between caring and technology and that technology narrows the nurses' focus and obscures the patients' social needs (Gjengedal, 1994). On the other hand, Gjengedal (1994) shows that technology is incorporated in the care of the patients and that intensive care to a great extent is dependent on its technology. The tools are delegates for human activities or sometimes the staff members' extended arm (Polkinghorne, 2004). Both technology and caring relationships are of indispensable value. So far there is little evidence to suggest that the two roles cannot coexist in harmony (Alasad, 2002). However, we require a type of technological thinking that seeks to examine our ambivalence towards technology (Barnard, 2002; 2004).

Continued polarization of technology and humane care may comprise a discourse that is more in the service of maintaining a distinctive professional identity than of improving nursing care. Technology is thus not simply or necessarily a paradigm of care opposed to touch, but rather also an agent and object of touch. Technology can itself be a humanizing factor, even in the most technologically intense arenas of health care. The distinction between technology and humane care confronts us with the core issues of professional position and power (Barnard & Sandelowski, 2001).

The question of dehumanization

Maintaining a distinction between technology and humane care may reinforce or undermine stereotypes and prejudices concerning care and link dehumanization with the presence of machinery and equipment (Barnard & Sandelowski, 2001). Dehumanization of the healthcare system is taking place. Important human values, like concern and respect for individual human beings might be sacrificed in favour of technical efficiency when choices have to be made. What determines whether a technology dehumanizes, depersonalizes, or objectifies is not technology per se, but rather how individual technologies are used and operate in specific user contexts, the meanings attributed to them, how any one individual or cultural group defines what is human, and the potential of technique to emphasize efficiency and rationale order. Whether and how the distinction between technology and humane care serves our patients or caring in an era when divisions that once seemed 'fixed and fundamental' (ibid).

It is common to categorize technology as nonhuman. Pacemakers and artificial joints implanted in living human beings and artificial intelligence systems regularly confront us with the reality of and potentiality for living artefacts and vital machines (Channell 1991). Cyborg symbols blur the line between animate and inanimate, between human and machine (c f anthropomorphisms). In

the case of organ transplantation or artificial implants, personalized and objecti-fied body parts challenge the notion of what would be a unified embodied self (Alapack, 2007).

PROBLEMATIZING REASONING

Much of intensive care practice concerns the restoration of disordered physiol-ogy and the maintenance of such physiology. Extensive technological develop-ments in conventional monitoring have concentrated on improvements in signal processing, displays and their reliability. Elucidating the patients' experience of being treated in these environments, however, receives scant attention (Gjenge-dal, 1994; Granberg Axèll, 2001; Wikström 2003; 2007).

A literature search made obvious that there have been few recent em-pirical studies conducted within caring science with the focus upon the ICU pa-tients and their experiences of being cared for in technologically intense envi-ronments. The nurse's role, working situation and tasks dominate. Scant atten-tion has been made to patients' stories and experiences. But the trend seems to be changing. Research has been conducted with a certain focus.

Research concerning the ICU patients' unreal experiences has been conducted (Granberg Axèll, 2001; Adamson, Murgo, Kerr, Crawford & Elliott, 2004; Löf, Berggren & Ahlström, 2006). The importance of having visits from friends and family (Eriksson & Bergbom, 2007). The predicament of being next-of-kin to an ICU patient has been elucidated (Bergbom & Askwall, 2000; Jo-hansson, 2006), as well as vulnerability, memories and stress (Adamson et al, 2004; McKinley, Nagy, Stein-Parbury, Bramwell & Hudson, 2004; Samuelson, 2006), communication problems (McKinley et al, 2004; Alasad & Ahmad, 2005) and the experiences of leaving the ICU (McKinney & Deeny, 2002). Other re-searchers have focused upon non pharmacological interventions that might ease the patients' distress, such as tactile touch (Henricson, Berglund, Määttä & Segesten, 2006) and music therapy (Nilsson, Unosson & Rawal, 2005).

Technology and nursing in ICU has mainly been elucidated from a theo-retical point of view (Couchman, Wetzig, Coyer & Wheeler, 2007; Coyer, Wheeler, Wetzig & Couchman, 2007; Fredriksen & Ringsberg, 2007) and not empirically, although there are exceptions (Gjengedal, 1994; Lindahl, 2005; Wikström, 2007). No phenomenological studies could be found that uncovered the meaning of the nexus between critical illness and technology.

ICU patients are distressed (Bergbom-Engberg, 1989; Gjengedal, 1994; Granberg-Axèll, 2001; Wikström, 2003; Samuelson, 2006). The high-tech design of the modern ICU accommodates splendidly critically ill patients. The space

contains a wide variety of sophisticated monitoring devices and an array of signal processors and reliable displays that allow continuous assessment of vital body functions (Wikström, 2007).

This impressive array of complex equipment that surrounds the serious ill patients, their relatives and staff members allows Western medicine to take unprecedented care of the physiological damage to the human organism. Is this an unalloyed gain? Is there a price we pay? What can be done to relieve the patients' distress? Is technology outmanoeuvring humanity? Why is it taken for granted? Does technology stand in between the persons in the relation? What (who) gave technology this strong and unquestioned role? Minimal attention has been paid to elucidating the patients' experiences of having one's world capsize.

AIM

The overall aim of the thesis was to uncover the meaning of care in technologically intense environments. The specific aims were to:

I.   ascertain whether music therapy had a measurable relaxing effect on patients who were temporarily on a respirator in an intensive care unit (ICU) and after completion of respirator treatment investigate those patients' experiences of the music therapy

II. develop a knowledge-base of what it meant to be critically ill or injured and cared for in technological intense environments

III. uncover the meaning of being a caregiver in the technological intense environment

IV. find from a philosophical point of view a more comprehensive understanding for the dominance of technology within intensive care

METHODOLOGY

The overall perspective of the thesis is grounded in the lifeworld theory. But, epistemologically, the first study (I) was conducted from a biomedical perspective. In study II and III the epistemological frame is phenomenology. Phenomenology is also the integrating ground for most of this research's structure, since the lifeworld perspective is used in two of the three empirical studies. Furthermore, the theoretical study (IV), that follows the empirical results, is conducted from a phenomenological perspective. It is the comprehensive frame around all the frames with the purpose to contribute to a deeper and broader understanding of a very complex phenomenon.

Phenomenology

Phenomenological philosophy is an essential element of the epistemology that provides a foundation for human science research (Dahlberg et al, 2001). The Greek word 'phainomenon' signifies 'to show itself' (Heidegger, 1962). A phenomenon is 'that which shows itself in itself', what becomes manifest for us. As researchers, we 'go to the things', i e, we stand in such a way that the things can show themselves to us. Thus, what shows itself is understood as a phenomenon (Husserl, 1998; Dahlberg et al, 2001). Phenomenology is the study of 'phenomena': appearances of things, or things as they appear in our experience, or the ways we experience things, thus the meanings things have in our experience. Phenomenology studies conscious experience as experienced from the subjective or first person point of view. Thus the things that we are closest to are the things that are most hidden from us (Heidegger, 1962). The phenomenological researcher aims to provide a rich description of lived experiences. We should allow, then, that the domain of phenomenology - our own experience - spreads out from conscious experience into semi-conscious and even unconscious mental activity, along with relevant background conditions implicitly invoked in our experience. In the practice of phenomenology, we describe and analyze structures of experiences in ways that answer to the lived experience. Phenomena are whatever we observe (perceive) and seek to understand and explain. Epistemologically, phenomenology helps to define the phenomena on which knowledge claims rest. To achieve knowledge about the nature of consciousness, a distinctive kind of first-person knowledge is required (Dahlberg et al, 2001).

In the phenomenological approach, the research begins with detailed concrete descriptions of specific experiences of everyday attitudes of others. It is important that the description is concrete and with a minimum of generalizations.

Similarly, lifeworld research requires the maintenance of an open and sensitive attitude towards the phenomenon in focus, and the researcher must therefore be aware of the necessity of always adhering as closely as possible to the phenomenon being studied. Consequently, this approach holds that we must try to withhold past knowledge about the phenomenon we are researching, to avoid 'false' pre-understanding dictating the emerging understanding (ibid).

The lifeworld approach

The lifeworld is the ground for phenomenological philosophy. The overall aim for lifeworld research is to increase the understanding of humans' existence by illuminating their own perspective. The informants will, thereby, be heard on their own conditions and integrity and respect is preserved. Great advantages can be gained by paying attention to the patients' perspective, such as listening to the persons lived experience of their situation (Dahlberg et al, 2001).

The lifeworld comprises the world as we perceive it. This lived world is pre-reflective, i e, it takes place before we think about it or put it into language (Merleau-Ponty, 1995; Husserl, 1998; Gadamer, 2004). The idea of the lifeworld is that we exist in an everyday-world that is filled with complex meanings which form the background of our everyday actions. The term lifeworld directs attention to the individual person's lived situation. Another purpose of lifeworld research is the description and elucidation of the lived world in a way that expands our understanding of human experience. A lifeworld perspective means that people's everyday life is acknowledged. However, scientific work is a human activity that is part of the lifeworld (Dahlberg et al, 2001). We can never go 'beyond' the lifeworld. But what we can and must do is to take a distanced stance from the natural attitude and adopt a phenomenological attitude in which we problematize the natural attitude in favour of a reflective attitude. The natural attitude is the everyday engagement in our existence and experience that we take for granted and do not question (Husserl, 1998).

The lifeworld perspective also means to see, understand, describe and analyze the world or parts of it, as it is experienced by human beings. This approach is neither subjectivistic nor objectivistic, neither materialistic nor idealistic. It focuses on the relationship and fusion between person and world. Immersed in their daily world of cares and concerns, people normally do not consider the lifeworld; it is concealed.

A phenomenological approach works to unmask the lifeworld's concealment, bringing its aspects and qualities to explicit scholarly attention. From the lifeworld approach a blood sample is not merely an objective number, but firstly something that is lived and experienced by a patient, and something that affect the patients' life and/or care (Dahlberg et al, 2001). Every human being's uniqueness has a higher priority than the group with its similarities, which is important within health care where labelling and categorizations often take place. Every experience is unique. The concepts of people's lifeworld experiences have similar structures, which can be described, but there are infinite variations on the same 'theme' between individuals. Humans are thus both alike and unlike (ibid).

We can never reach a definite and universal truth about the character of the life-world and the existence since the truth is unique and variable. To give justice to the lived reality is to be adaptable to its ambiguity. Caring science must be open to different ways and methods to reach the patients' perspective. If we restrict ourselves to a single subject of experience, the lifeworld can be looked upon as the rational structure underlying the 'natural attitude'. A given subject's life-world consists of the beliefs against which her/his everyday attitude towards her-self/himself, the objective world and others receive their ultimate justification (Dahlberg et al, 2001). The basic mistake of dualism is the thought that my body is just a dwelling I live in and not me. In the same way I belong to the world just as much as the world belongs to me, I also belong to my body (Svenaeus, 2000).

Intentionality

The central structure of an experience is its intentionality, its being directed toward something, as it is an experience of or about some object. An experience is directed toward an object by virtue of its meaning together with appropriate ena-bling conditions (Husserl, 1998). Basically, phenomenology studies the structure of various types of experience ranging from perception, thought, memory, imagination, emotion, desire, and volition to bodily awareness, embodied action, and social activity, including linguistic activity. The structure of these forms of experience typically involves what Husserl called 'intentionality', that is, the directedness of experience toward things in the world, the property of conscious-ness that it is a consciousness of or about something. According to classical Husserlian phenomenology, our experience is directed toward - represents or 'in-tends' - things only through particular concepts, thoughts, ideas, images, etc. These make up the meaning of a given experience.

Phenomenological bracketing and bridling

The phenomenological reduction involves a radical transformation in our ap-proach where we strive to suspend presuppositions and go beyond the 'natural attitude' of taken-for-granted understanding. This process is a foundational, di-mension of phenomenological research. If reduction is not articulated and util-ized, the work can not be considered to be phenomenological (Giorgi, 1997). We always have some kind of pre-assumptions with us (Gadamer, 2004). Therefore, in the encounter with a patient in a ward or a participant in a study, it is a ques-tion of balancing between confirming what you already know, and the possibility to use previous knowledge to understand the patient or participant. The pre-understanding is thus a guide that makes the dialogue fruitful, but it can also re-duce the ability to capture the 'new' or unpredictable in the narratives (Dahlberg et al, 2001). In Merleau-Ponty's (1995) words, we have to find a way to slacken the firm threads of intentionality that tie us to the world. We can not cut them off, but we must slacken them in order to give us the elbow room that is needed if we want to make clear what is going on in the encounter between ourselves and the world. This phenomenological attitude and reflective stance means 'bri-dling' (Dahlberg, 2006) our immediate and spontaneous understanding of the

world, so that the pre-understanding does not affect our understanding in an un-controlled way. Bridling means that we include phenomenological reflection in that primordial relationship with the world, and because the meaning of 'the thing' is an open infinity, bridling thus means that we do not make definite what is indefinite. We do not ascribe meaning to things in just any way (Dahlberg & Dahlberg, 2003).

The ambition to 'bridle' the process of understanding does not mean that we totally set aside our pre-understanding, which, in fact, is a necessary condition for all understanding and something that we cannot escape. Instead bridling means a reflective and critical attitude in which the researcher endeavours to question their pre-understanding in order to minimize its influence on the emerging understanding. The researcher must be respectful and prepared to be surprised (Dahlberg et al, 2001). The researcher has to restrain from the understanding in the form of personal beliefs and other assumptions that might mislead the understanding of meaning and limit the openness of the research. To wait actively for the phenomenon, and its meaning, to show itself (Dahlberg, 2006). This openness is acknowledged throughout the entire research process. Thus, it is also the phenomenon that 'dictates' the next step of the research design.

Slackening the threads of intentionality and putting ourselves at a distance in relation to the phenomenon could, according to Merleau-Ponty (1995) and Gadamer (2004), actually bring us closer to the meaning of the phenomenon. One of the challenges for the phenomenologist is that (s)he needs to know enough about the phenomenon of interest to have the credibility and the perceptivity to properly study it, while simultaneously bracketing (Husserl, 1998) this same knowledge. However, bridling cannot be practised in just any way because the distancing procedure could reframe us from an understanding of the phenomenon. The researcher should seek a stance that is not controlled by pre-understanding. Bridling means to slow down and to be more aware of the process of understanding than we are in 'natural' and unreflective attitude, so that the researcher can discover the meanings and the essence of the phenomenon. Bridling, however, does not mean that the pre-understanding vanishes. Instead, the researcher is aware, as far as possible, of her/his own previous knowledge of the phenomenon and then searches for what is unknown or new. Bridling, is more about taking a controlled approach and attitude to the research, opposed to the more specific finitude of bracketing. It requires an acknowledgement of the limitations of being able to totally set aside one's pre-understandings, and instead committed to being disciplined about how these assumptions, and pre-understandings might influence the data collection and analysis (Dahlberg & Dahlberg, 2003).

Design

Table 1. Overview of design, data, data collection and data analysis in the different studies of the thesis

	Paper I	Paper II	Paper III	Paper IV
Design:	Intervention, quantitative and qualitative	Explorative, qualitative	Explorative, qualitative	Descriptive, interpretive
Data	20 ICU patients	9 ICU patients	10 ICU caregivers	Essences (study II-III), literature
Data collection:	Objective parameters, interviews	Interviews	Interviews	Literature
Data analysis:	Content analysis, Descriptive statistics	Phenomenological analysis	Phenomenological analysis	Hyper-reflection

Clinical setting

The ICU, where the empirical studies were conducted, is part of a moderately large hospital in southern Sweden that cares for patients of different ages with various diagnoses. However, the patients in study II have been treated in several other ICUs apart from the one described in the text. When the first study was conducted the total number of respirator hours is in the region of 12,000 annually, which corresponds to 500 days. The usual reasons for patients requiring intensive care were chronic obstructive lung disease, sepsis, major surgery, and less often, major trauma. The unit had 16 beds. Staffing levels varied considerably although there are seldom fewer than eight persons per shift. The staff comprised nurses (both RN and EN), physicians and physiotherapists. Since then the number of patients has increased and the total number of ICU patients in the year study II was conducted was 658. The unit had 17 beds out of which six beds were for ICU patients. Staffing levels vary from eight to twelve per shift. The staff comprised nurses (RN and EN), physicians and physiotherapists. The majority of critically ill or injured patients are nursed in single rooms with closed doors. When study III was conducted the unit had six ICU beds. Staffing levels varied from eight to twelve nurses and one to two physicians daytime and one physician at night. The staff comprised nurses (RN and EN) and physicians. There were 30 RN, 31 EN and 18 physicians employed at the ward.

Sample and criteria

In the first study 20 adult, ICU patients who were temporarily in need of mechanical ventilation and whose condition was physically stable was included consecutively (table 2). First the participants were recruited to the intervention group. After this participants for the control group were included. Every patient

who was admitted in ICU during a certain period of time and who filled the inclusion criteria were asked to participate. Patients were excluded if it was known that they were suffering from a severe psychiatric condition, severe depression or were mentally retarded. Patients with cerebral haemorrhage thought to be at risk of psychological effects were also excluded. The reason for excluding these patients was that their condition could render a follow-up interview more difficult or even impossible.

Table 2. Participants in study I

	Intervention group *N=10*	*Control group* *N=10*	
Men/women	5/5	3/7	Ns
Age (years) mean/median/range min-max	68,7/67/54-81	64,2/73/27-81	Ns
Time on mechanical ventilation (days) mean/median/range min-max	13,95/11/1-31	9,1/9,5/2-19	Ns
Diagnoses:			
Infection	3	2	
Respiratory distress	3	4	
Trauma	1	2	
Postoperative care	3	2	

Ns= non significant

Criteria for inclusion in study II were: adult patients in ICU with a life threatening condition or manifesting insufficiency of vital organ functions. Concretely, two female and seven male patients, served as participants. The ages range was 45 to 74 years old with a median of 59 years. The participants' admission in the ICU with either a critical illness or injury was between one and seven weeks (table 3).

Table 3. Participants in study II

Informant	*Sex*	*Age*	*Diagnosis*	*Treated in ICU (days)*
1	F	72	Myocardial infarction	10
2	M	69	Myocardial infarction	17
3	M	45	Trauma	49
4	M	65	Trauma	10
5	M	56	Infection	7
6	M	59	Trauma	14
7	M	72	Infection	13
8	F	74	Infection	28
9	M	58	Trauma	49

F= female, M= male

For study III the chief clinician and the charge-nurse choose ten participants of different occupations, ages, sex and with various care giving experiences within ICU. Six females and four males agreed to take part in the study. Their ages ranged from 29 to 58 with a median of 45.5 years. The number of years they had worked in ICU ranged from 1.5 to 27 with a median of 16.5 years (table 4).

Table 4. Participants in study III

Informant	Sex	Occupation	Age	Work experience (years)
1	F	RN	29	2
2	F	EN	55	25
3	M	P	30	1.5
4	M	EN	48	19
5	F	RN	35	6
6	F	EN	58	27
7	F	EN	46	26
8	M	RN	46	14
9	F	RN	34	6
10	M	P	45	10

F= female, M= male, RN= registered nurse, EN= enrolled nurse P= physician

Data collection

In study I both quantitative and qualitative methods were applied. The quantitative part of the study was concerned with measurement of quantitative parameters, i e, pulse, systolic and diastolic blood pressure, respiratory rate, and oxygen saturation. Data was collected before during and after the music therapy session. In accordance with a special protocol, the various values were recorded at five-minute intervals during the music therapy session (for further details, see article I). The qualitative part of the study consisted of semi structured interview questions concerning recollections and experiences of respirator treatment and music therapy. Six of the ten patients in the intervention group were interviewed. During the interviews, the patients were encouraged to speak freely in answer to the questions they were asked. In the case of the patient not recollecting, further, more in-going questions were asked. The time taken for interviews was between 20-30 minutes. In study I an intervention also took place. Patients in the intervention group listened to music via headphones, which allowed the patient a moment free from disturbance whilst the control group rested under similar circumstances but without the headphones with music. Classical music was played for 30 minutes in conjunction with night sleep. Each patient listened to music on two separate occasions. All patients wore headphones during the entire measurement period, i e, from five minutes before intervention until 60 minutes after intervention.

For the second study, open-ended interviews served to elicit in-depth information about the patients' lived experiences of being critically ill or injured and their perception of the treatment in a technologically intense environment. I visited the participants at least once prior to the interviews, some were visited several times. So when it was time for the interview they all 'knew' me. Two interviews took place in the patients' homes a few days after discharge. The others occurred in the patient's room in the hospital. The interviews lasted between 52 and 87 minutes. In the third study, open-ended interviews was conducted to gain in-depth information about the caregivers' lived experiences of treating critically ill or injured persons in a technologically intense environment. All of the interviews occurred in a small conference room outside the ward. The interviews

lasted between 55 and 76 minutes, were audio-taped and transcribed verbatim. From a philosophical point of view and with starting point in the empirical studies II and III the fourth study contributed in the understanding for the almost total dominance of technology in care in ICU. I reflected upon my reflections and critically thought about them in relations to the philosophy of technology.

Analysis

The analyzing processes are more thoroughly described in the different method sections of the studies (I-IV).

Descriptive and inferential statistics

Descriptive statistics (study I) were used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data. Descriptive statistics were used to present quantitative descriptions in a manageable form. Each descriptive statistic reduces lots of data into a simpler summary. Descriptive statistics is a branch of statistics that denotes any of the many techniques used to summarize a set of data. In a sense, data are using on the members of a set to describe the set. One important use of descriptive statistics is to summarize a collection of data in a clear and understandable way. Inferential statistics, is used when trying to reach conclusions that extend beyond the immediate data alone. For instance, to make judgments of the probability that an observed difference between groups is a dependable one or one that might have happened by chance. Thus, inferential statistics is used to make inferences from our data to more general conditions. Descriptive statistics is used simply to describe what is going on in the data. Parametric repeated measurement analysis of variance (ANOVA) was used to determine if there were any differences between or within the groups over time. Paired t tests were used to examine differences between two points of measurement within the groups (Altman, 1992; Kirkwood, 2003).

Content analysis

One characteristic of qualitative content analysis is that the method focuses on the subjects and contexts, and emphasises differences between and similarities within codes and categories. The method also deals with manifest as well as latent content of a text (Polit & Hungler, 2005). In thematic content analysis, the method for analysis used in study I, the researcher created categories from statements given by the participants. The analyzing process followed certain steps in order to get a list of categories mentioned in the interviews with the aim to produce a detailed and systematic description of the themes and issues addressed in the interviews. These themes were then linked together under a reasonably ex-

haustive category system (Burnard, 1991). In this study no underlying concepts were identified, thus it was a manifest content analysis.

Phenomenological analysis

To tap further into the complex, ambiguous and emotionally intense environment of the ICU, a reductive method was considered inadequate. Qualitative methodology offers great potential for discovering complex phenomena and new aspects of caring. Study II and III were therefore anchored in phenomenological philosophy. To fully understand the patient and the caregiver, we have to understand the changes in their lifeworld. A descriptive, phenomenological research approach is able to meet the complexity and ambiguity of the world (Dahlberg et al, 2001). The phenomenological approach also provides the principles for data gathering and research. From a phenomenological approach, reflective lifeworld research describes the world as experienced and prior to any theories devised to explain it. Central in this approach is an emphasis on a researching openness, which shows fidelity to the phenomenon. Consequently, the researcher must turn to the experienced world with the aim of understanding the phenomenon on its own premises, instead of taking its meaning 'for granted'. Of great importance in lifeworld research is to maintain an open and sensitive attitude, and openness implies a way of being for the researcher (ibid). Gaining knowledge about caring in technologically intense environments requires a method that can deal with this complex and ambiguous phenomenon without losing vital meaning or ending up in reductionism. Study II and III were therefore carried out with a lifeworld approach.

The structure of phenomenological analysis (Study II and III) can be described as a movement between whole-parts-whole. It is crucial that each part is understood in terms of the whole, but also that the whole is understood in the terms of the parts. The goal is to understand data on their own conditions. It is necessary to be sensitive to both the whole and the parts in order to capture the meaning of the phenomenon, including the inherent ambiguity of the lifeworld. On the whole, this form of analysis transforms concrete lived experience to an abstract level of description, where the main goal is an explication of a phenomenon's essence or general structure. The essence is an abstract description of what 'defines' a particular phenomenon, while the constituents are the particulars or variations of the phenomenon's totality (Dahlberg et al, 2001; Giorgi, 1997).

Hyper-reflection

The fourth study was an interpretive analysis with the purpose to reach an understanding of the impact of technology in care in technologically intense environments. This was made by a hyper-reflection upon the attitude of technology as it shows within intensive care. The empirical studies II and III served as data and were linked to the rationales of Heidegger and Ihde in order to elucidate the empirical results, to seek a broader perspective and reach a deeper understanding about the dominance of technology in care in ICU. The term "hyper-reflection" is borrowed from Merleau-Ponty (1964b), who states that thinking always dou-

bles over on itself, and in the process shows us how we are part of the very field we study. Simply put, I reflected upon my reflections and critically thought about them. To repeat, the thinking serves to pinpoint what is the essence of this technological attitude that rules, in particular in our hospitals; secondly, to articulate a balanced framework between that attitude and the mandates of caring and vision of cure. Within phenomenology all experience is seen as experience of something. The tool or equipment in use becomes the means, not the object, of the experience. To understand the diversity of technology, the analysis needs the empirical aspect (Heidegger, 1977). To analyze technologies you do not simply analyze a subjective description of the users and the objective situation of what technology does in the world. It is the interaction between humans, whether individual or socially, and an environment accordingly that should be examined (Ihde, 2002).

Ethical considerations

Consent for study I was obtained from the Regional Committee for Medical Research Ethics at Lund University, Sweden. Since then Swedish law concerning research on human beings has changed. There is no longer need for a written consent from an ethical board if written consent has been obtained from the informants and if the study does not involve a physical intervention affecting a person (Statute from the Swedish National Board of Health and Welfare, SFS, 2003:460). Studies II and III, conducted in 2005-2006, conformed to the principles outlined in the Declaration of Helsinki (World Medical Association Declaration, 2005).

For all the empirical studies the chief clinicians were contacted and gave their written consent. The registered nurses in charge of the units also gave their permission to conduct the study. Informed consent, both verbal and written, was obtained prior to the interviews. All participants who were asked to participate in the study accepted. Information about the study was given, and all participants were assured of confidentiality. The analysis was conducted with the intention of maintaining the integrity of all persons taking part in the study. To meet the demands of the principle of nonmaleficence no interviews were made until the patients were in a stable condition, both physically end mentally. It can be an exhausting experience to participate in an interview a short time after a serious illness. A sensitive attitude is therefore important and some of the patients were therefore visited several times before the interview took place, even if they had given their consent earlier. In the interview situation, however, all patients gave the impression of being quite satisfied with telling about their experiences.

I have worked as an ICU nurse for ten years, but not regularly for the last 5 years. I undoubtedly benefited from my background as an ICU nurse, which enabled me to assess the patient's condition. To ascertain the principle of respecting the patient's autonomy, potential informants received a letter of information where the aim of the study and the interview procedure were explained. They were also informed about the right to voluntary and free participation, and that they could withdraw from the project at any time, without having

to give a reason for the withdrawal. Ensuring confidentiality was also explained. In addition, a declaration of secrecy, signed by the researcher, and a consent form to be signed by the informant, were delivered.

FINDINGS

This section presents the summarized findings of the respective study. From the phenomenological articles (II-III) the essences are presented. For the complete findings and for a more thorough description of the different aspects of the findings, please see each individual study.

Music therapy as a complementary treatment for ICU patients

Study I showed that ongoing music therapy led to significant changes in blood pressure in the intervention group. That no significant differences were shown between the two groups could be due to the limited sample. The qualitative part of the study showed that the patients remembered little of their time on the respirator. In the intervention group, both systolic and diastolic blood pressure fell during music therapy only to rise again after completion of treatment. The differences were statistically significant ($p<0.005$). The mean systolic blood pressure fell from 136 mm Hg to 124 mm Hg during treatment. Sixty minutes after the completion of treatment, systolic blood pressure had risen from 124 mm Hg to 131 mm Hg ($p<0.017$). Heart rate fell, during music therapy but this was not significant ($p=0.065$). The increased pulse rate that occurred after completion of the session was statistically significant ($p<0.002$). These changes did not occur in the control group. No statistically significant results were found for respiratory rate and SpO2 for either group. Repeated measurements showed no significant differences between the two groups, nor were there any differences over time. Paired t tests, however, showed significant mean differences between two points of measurement on systolic, diastolic and heart rate in the intervention group. These differences were not found in the control group. Patients in the intervention group wore headphones during the entire measurement period i.e. before, during and after the session. Both blood pressure and heart rate rose significantly after completion of music therapy even with the headphones still in place. The choice of music in the study has adhered to that described in the literature: full of character, slow and repetitive rhythm, predictable dynamics, low tonic register, with no vocal content.

Interview data showed that the patients remembered little of their time on the respirator in ICU. Recollections were vague and merged together. Anxiety

and discomfort were also described in connection with respirator treatment, as well as illusory feelings. What was important to the patients and what helped them during their stay in ICU was close relationships, both with next-of-kin but also with some of the staff. The interviews also revealed that the patients had no recollections of the music therapy. However, clinical effect could be shown by the quantitative data collected. It is conceivable that the relaxing effect of music contributed to the lack of recall in those patients. The conclusion of the first study was that music therapy is a simple, inexpensive and reliable tool which can be applied with advantage in the nursing of ICU patients without risking unwanted side-effects.

To be critically ill or injured in technologically intense environments

The essence of **study II** showed that critical illness/injury threatens life. This threat of death overshadows everything. It perforates the existence of the individual now confined in a frightening incomprehensible environment, one under the sway of machines, one that restricts and constrains, and one that fosters passivity and compromises integrity. Control over ones body withers; influence over one's situation disappears; freedom vanishes to determine daily life events. Caregivers take for granted the machines in the ICU, but rarely discuss with the patient their invariant and alienating impact. Suffering persists and terror lingers. Unacknowledged and uncorroborated experiences trigger existential loneliness and dread.

Patients admitted to the ICU have been socialized to believe in the expertise, competence and authority of the medical personnel. Once admitted and medically compromised, they adapt and adjust to the environment and eventually to its routine. At the start of treatment, patients do not question but typically trust the health care system and put their lives into the hands of the caregivers. On the one hand, this giving-oneself-over and trying-to-be-a-good-patient, promotes the sense of safety. On the other hand, it renders one extremely vulnerable. It soon becomes disturbingly evident that the 'good hands' into which one has put their life turn out to be mostly an extended arm of technology. Addressing the cardinal issue of the vital organs and their functions mostly preoccupies caregivers. The impact upon patients is dreadful. They apprehend themselves as objects of observation, scrutinized and monitored, subjected to rituals of power. Although competent supervision stabilizes the biological body, nevertheless the patient feels marginalized; a stranger cared for by a stranger. The roaring shout of technology silences the sick person's timid utterances about their real and shifting needs, medical and psychological-existential. Muted patient voices deafen caregivers' ears.

The four constituents are: [1] the confrontation with death, [2] forced dependency, [3] an incomprehensible environment and [4] the ambiguity of vigilance and invisibility.

Giving care in technologically intense environments

The essence from **study III** revealed that work in a technologically intense environment takes head, hands and heart. In the ICU, death hovers. The business of intensive care is life and death. However, technology looms as a conspicuous, imposing and dominant presence. Its blare muffles death's whisper. Within that silence, a specific structure emerges. A hierarchy arises. The caregiver sits atop; the patient knees on the bottom rung. From the human perspective, the price tag of this arrangement is expensive. Insofar as technology drives treatment and co-shapes care giving attitudes, it impedes any possible close encounter and sabotages the intention of developing health-inducing interpersonal relations. It also compromises the caregiver's vision and shackles her actions. The very act of responsibly reading and regulating instruments easily fuses the patient and the machinery. The act skews the balance between objective distance and interpersonal closeness. It is as if technology outmanoeuvres caring insofar as the effect of medicine and machinery-management on patient care has become routine. Machines mostly cater to organisational demands for safety, routine, control and efficiency. Sharp technological vigilance, however, renders the patient qua unique individual invisible; dialogue deteriorates into monologue. Technology, with its exciting captive lure and challenging character, seduces the caregivers and lulls them into a fictive sense of security and safety. At the same time, they are vaguely aware that the technological net into which they have been draw and can only exit with difficulty, is frayed. Caregivers implicitly sense the insufficiency of something gone awry.

The three constituents of this phenomenon are: [1] mastery or servitude under technology, [2] to be secure in insecurity and insecure in security and [3] to make the human technological and the technology human.

The attitude of technology in intensive care

Technology abides; there is no point in discussing its be-or-not-be. The wise thing to do is to accept technology as a part of the ICU staff's everyday life and ponder the fact that the Janus-faced technology affects us all and thence address the question as to how it affects us. The philosophical, theoretical **study IV** made it evident that technology should be a catalyst; do its 'thing' and withdraw 'unnoticed'. Somewhere along the way, we have come to believe that technology can solve all our 'problems', that a machine does it better than our hands and our heart, our closest 'instrument', ourselves - my touch, my ability to talk to the patient, to listen, to give comfort and solace. The structure of medical treatment in no way grants either space or time for intimate dialogues.

It suits in the ICU context to differentiate ambiguity from ambivalence. The two border on each other. Ambiguity means that something can be correct from at least two perspectives, and that one might ooze complex emotions connected to

each viewpoint. In the ICU ambiguity doubles. The caregivers feel insecure that if the encounter should become too emotionally close and personal, then the patient might ask questions or discuss matters they are ill-trained to handle. When the ventilator malfunctions, the caregiver quickly employs the technique for ventilating by hand, but is much less ready to meet a person in distress with a comforting touch. Thus, the 'failed' moment would call into question their professional identity. A modern ICU is a great challenge. In ICU there is cognitive complexity and emotional intensity and caregivers are juggling a slippery handful of cards. Ambivalence indicates the split. Concerning the matter under consideration - the technical dimension of care and the human side of nursing - the caregiver stops juggling, and lets the cards spill into two piles. She splits.

The caregiver is stuck within a system that obscures their ability to see the suffering. After all, the bottom-line is that the screen must be monitored to try to guarantee that the top line does not go level. The status of the patient must be gleaned from screens and other objective parameters. Within today's health care system, 'bad' laboratory test results are being treated, not sick patients. But a vicious circle ensues. The sharpness of technological vigilance makes the patient feel personally invisible and marginalized. Technology, however, can never replace human touch, closeness and empathy. Both technology and caring relationships are of indispensable value and the role of the carer can never be substituted by any kind of machinery. Machinery and tools are useful, not replacements for the art of nursing and healing. It is a question of balancing state-of-the-art technology with integrative and comprehensive care, of harmonizing the demands of subjectivity with objective signs.

Synthesis of care in technologically intense environments

Work in a modern ICU is challenging. Caregivers must juggle a precarious handful of cards of cognitive complexity and emotional intensity. Despite being constantly monitored and observed, ICU patients express that they feel invisible as people, reduced to the status of organs, objects or diagnoses. Within the highly technological environment, the patient and the apparatus meld into a unit, one item to be regulated and read. From the patients' perspective, caregivers demonstrate keen vigilance over technological devices and measured parameters, but pay scant attention to patients' stories and experiences. This wonderfully precise reading of machine data, however, compromises care. Although other nursing activities, such as 'just listening' and inspiring trust and confidence, cater to the demands of why the organization is there in the first place, nevertheless are not a priority.

From the caregivers' point of view, giving care in technologically intense environments is characterized by contradictions and ambivalence. Technology is both master and slave and the caregivers must strive for security in spite of insecurity. Technical tasks take precedence or have more urgency than caring behaviour. Beleaguered by technology, the caregivers' ability to 'see' the

person attached to the machine is reduced. In the caregivers' stories, as well as the patients' it is obvious that technology drives treatment, co-shapes care giving attitudes, impedes any possible close encounter and sabotages the intention of developing health-inducing interpersonal relations. Ambiguity abounds. Juggling the 'moments' of being master or slave, of being secure in insecurity and insecure in security while caring for a patient, monitoring a machine and trying to making the human technological and humanize technology are mind-boggling and heart-rending chores. Armed with double vision and double skills, the caregiver can flexibly decide what need to be carved up, isolated and addressed as a specific problem, and what requires assemblage into a human whole. The challenge for caregivers in ICU is to know when to heighten the importance of the objective and measurable dimensions provided by technology and when to reduce the importance of these and magnify the patients' lived experiences. If basic human condition of life/death were to take central place in medical-nursing, the professional would mature and achieve better balance between the technical and caring. It is a question of balancing state-of-the-art technology with integrative and comprehensive care, of harmonizing the demands of subjectivity with objective signs. In terms of nursing care, the creative act would be to re-forge the broken bond between techne, 'the act of nursing' and poesis, 'the art of nursing'.

DISCUSSION

of methodology

Overall design

Caregivers who serve in the ICU make a valuable, unique contribution to the setting and to caring practices in general. Until recent history, they never attempted to produce credible evidence gathered in rigorous ways. Entering the 21st century, they must exude more confidence about their craft. Already the caring profession has begun to exercise caution concerning the adoption of positivistic ideology which compromises their basic mission to care. To this end it is essential that caregivers develop both professionally and academically to be able to meet the challenge of redefining critical care in the 21st century (Timmins 2002). Extensive technological developments in conventional monitoring have concentrated on improvements in signal processing, displays and reliability. Elucidating the patients' experience of being treated in these environments, however, receives scant attention. In my work as a nurse in ICU I have witnessed patients'

distress that the literature also documents (Bergbom-Engberg, 1989; Gjengedal, 1994; Granberg-Axèll, 2001; Wikström, 2003; 2007). At first I wanted to ease the patients' discomfort, giving them an opportunity for some relief. Therefore, in my first study I offered an intervention to mechanically ventilated patients. Classical music was played in conjunction with night sleep. To reiterate, the study showed that music therapy relieves distress and has a relaxing effect. The patients, in this study, remembered little of their time in ICU. The conclusion was that ICU nursing staff can beneficially apply music therapy as a non-pharmacological intervention. Music therapy is a simple, inexpensive and reliable modality tool which can be applied with advantage in the nursing of ICU patients without risking unwanted side-effects.

So, music had a positive effect. Still questions lingered: how did ICU patients really feel? What bothered them most during their confinement? They spontaneously mentioned 'constant light' and 'sound'. Was their distress connected to the ambience of the milieu? I still knew too little to proceed to evaluate and intervene. This behoved me to take a step 'back' to understand what the patients went through during their ICU stay. Study II focused upon the phenomenon of being critically ill in a technologically intense environment. How best to comprehend the influence of technology on nursing and patient care? I filled a missing gap in the phenomenological literature by uncovering the lived experience of being critically ill or injured and cared for in ICU. Focusing on the nexus between critical illness and technology, my second study tuned into the way the latter's loud voice silenced the shifting needs of ill people, and likewise compromises the competence of the caregivers.

Was it time for another interventional study now? No. The caring relation seemed to be central. Why was not the patient's voice being heard? I turned to the other part in the caring relationship; the caregivers'. Logically and phenomenologically it behoved me to quiz the caregivers, the other 'actors' in this dehumanized and highly technological environment. What did caring mean to them insofar as technological laces it so tightly? Thus, the third study uncovered the contradictions, ambiguities and ambivalence that jostle and collide in the milieu. Technology is two-faced, both master and slave. As master, it saves lives. Caregivers find security while 'reading' the patient. Not surprisingly, technical tasks take precedence or have more urgency than caring behaviour. Insecurity menaces the security of precise monitoring. Technical tasks serve as an ersatz for closeness. 'Classical' nursing activities, such as listening and inspiring trust and confidence, have become marginalized. Are not technological precision and care of indispensable value? The machine, to have any worth as a tool, requires human expertise. No machine can replace the art of healing. Insofar as a lack of balance holds between 'techne' and 'poesis', the caregiver is beleaguered and less efficient.

I had now come closer to the heart of the matter. It is not technology per se that determines dehumanization, depersonalization or objectification. Rather how individual technologies operate in specific user contexts matters. It is not medical technology as a praxis that deprives the patients of individuality, subjectivity, and dignity as human beings. Per se, a technological object does not create an alienation between self and body, nor derail the nurse from the mission to

care. A human and philosophical insight into the meaning of technology and its relationship to the world revels that it is the 'attitude of technology', Gestell, that skews the balance. In that relentless drive towards efficiency, care for human subjectivity gets bulldozed. My three empirical studies converge on this distinction.

One actor was yet to be investigated: technology itself. Before studying the effect of any intervention in a meaningful way, a deeper understanding of the almost total dominance of technology in care in ICU was needed. Without knowing the 'facts' properly, how can we know what to evaluate? What purpose would these intervention have and on which grounds? At this stage, the next logical and phenomenological step was a theoretical study: a hyper-reflection upon the empirical results. The sneaky suspicion lingered that deeply ingrained attitudes, in the 'way of thinking' in the west sabotage our most sincere desires and efforts to care and cure. The fourth study came to the conclusion that the flaw is not turning to the device, per se; it is the turning away from the person. Technology should be like a catalyst; I repeat, do its 'thing' and withdraw 'unnoticed'. Nowadays, it is figural, the presumed ultimate problem-solver. Gradually our faith has been eroded in our closest 'instrument' – ourselves – our hands and our heart.

Quantitative studies describes one part of the patients situation, the purpose is to show objective facts from an outside-perspective (third party). However, they do not capture the lived experience, the inside-perspective, the subjective dimension of 'being'. They do not seek the first party perspective (c f Svenaeus, 1999). Individuals and their living conditions can never be completely understood if they are not looked upon as living wholes. The significance of such a view is that we refer to humans as objective signs: laboratory results, x-rays, and externally identifiable symptoms, examination scores and grades, all make important contributions to health care, and to learning, but are of limited value when the purpose is to illuminate the human being and the lifeworld (Dahlberg et al, 2001).

Illness should not be understood merely technically, as an occasion for technologic-scientific and clinical intervention but also intellectually in connection with issues concerning the meaning and the possibilities of human nature. Phenomenology offers a systematic and rigorous philosophical perspective for elucidating illness as a distinct lived human experience, and it aids us in understanding the effects of illness upon our human nature (Kestenbaum, 1982). By helping to keep health professionals close to the experience of illness as lived through and by the patient, phenomenology reminds them of the fundamental humanness that clearly requires more than technical competence from those who 'treat' illness (ibid).

To best comprehend the influence of technology on nursing and patient care would be to capture the lived experience of care in technologically intense environments. It is not conscionable to assess a situation from outside it, measuring observable behaviour alone. This thesis concerns itself, therefore, with the multi-dimensional whole person who aches, break and bleeds, not just the one-dimensional stick figure who behaves as if not experiencing and creating meaning. Simultaneously, I wanted to ascertain the entire situation, the complete pre-

dicament of the ICU wherein everything does not drift as if encased in isolated bubbles, but interpenetrates and influences each other. Thus, in most parts of the thesis, I used a phenomenologically based qualitative method to gather experiences and meanings, to grasp the total structure and to capture the way a web of relationships co-shapes the greater whole. The rich data that was gained and the results of this study attest to the fruitfulness of a descriptive method to tap into matters of the heart, especially our death-bound heart.

Study I

For statistical problems there are several possible solutions. Analysis of variance (ANOVA) is used whenever there are repeated measures or repeated treatments of an individual. It is standard practice to do a test like ANOVA and follow up with pair wise comparisons. ANOVA was chosen in study I since all parameters had a normal distribution and the purpose was to determine if there were any differences between or within the groups over time. Paired *t* tests were used to examine differences between two points of measurement within the groups. Non-parametric methods do not have a lot of power when n is small. However, a *t* test can be useful even when comparing the means of two small groups. ANOVA is more efficient than multiple two-group studies analyzed via *t* tests, and with fewer observations we can gain more information. ANOVA can test each factor while controlling for all others; this is actually the reason why this method is more statistically powerful (i e, fewer observations are needed to find a significant effect) than the simple *t* test (Altman 1992; Kirkwood, 2003). A weakness of the study was that no single endpoint hypothesis was posed. Neither was the sample size for power tested.

The interviews showed that the patients remembered little of their time on the respirator and nothing about listening to music. The interview duration was short (20-30 minutes), partly due to the patients showing signs of exhaustion. Had the patients been given more time it is possible that more information had been elicited. By the time, I was an inexperienced interviewer and did not dare to put 'pressure' on the patients by posing what might be considered as 'tough' questions. The questions were perhaps unfortunate since they could be answered with either yes or now. However, follow-up questions were posed in case of a participant answering with only 'yes' or 'now'.

Qualitative content analysis focuses on the subjects and contexts. The manifest content analysis, i e, what the text says, is mostly presented in categories. Content analysis can be performed at various degrees of difficulty. Analysing content close to the text, the manifest content, can be a suitable starting point (Polit & Hungler, 2005). However this does not provide the in-depth findings that can be obtained with phenomenological analysis.

Validity

Ideally, all the facets of a study are designed so that if a particular finding is obtained, the conclusion reached is free from ambiguity. Central to statistic evaluation is the statistical power, i e, the likelihood of detecting differences between groups when differences exist within the population. When comparing smaller

groups, there is a risk of insufficient power. The matter of statistical significance is based on what probability level is selected to specify the degree of risk of reaching a false conclusion, i e, type 1 error (Altman, 1991; Kazdin, 2003). In this study the probability level was set at 0.05.

The control group did not add anything to the validity. Had I conducted this study today I would not have used a control group but instead had a larger intervention group and measured the differences within the intervention group. Each individual could have acted as its own control (i e, pretest-posttest).

Generalization
To which extent the findings can be generalized beyond the sample used, is also called external validity. From this small pilot study it is not possible to generalize. However, the results from study I, is confirmed by other researchers (see article 1). Also, the findings indicate a biological relevance. Patients in the intervention group wore headphones before, during and after the session (i e, from five minutes before until 60 minutes after the music session). Both blood pressure and heart rate rose significantly after completion of music therapy even with the headphones still in place which was shown in paired samples t test. From these results it seems reasonable to draw the conclusion that music therapy may have a better relaxing effect than the use of headphones without music. That the differences in repeated measurements between the two groups were inconclusive could be due to the limited sample.

Study II-IV
Within phenomenology, subjectivity and the world are reciprocally related and cannot be separated. It is not of interest to speculate in the peoples' reliability in the data. It is not the universal 'truth' that is being sought, but rather the individual person's lived experience of a certain phenomenon. However, this form of analysis transforms concrete lived experience to an abstract level of description, also called the phenomenon's essence or general structure (Giorgi, 1997; Dahlberg et al, 2001). The generalization can be related to the essence of the findings, the general structures, which are lifted above the concrete level in order to facilitate generalization. This essential structure can never be seen as universal, it is always contextual (Dahlberg et al, 2001).

I did not read the patients' medical records, since I wanted to share their lived experience. I did not want to risk that my pre-understanding would 'intrude'. The issue in phenomenological research is not whether an event actually took place exactly as the patients reported it; the important thing is to understand how the patient himself/herself experiences the event. The patients' records can be considered an interpretation of the patient's situation. What makes or does not make sense in a human life is impossible to define with any general validity (van den Berg, 1978). When a lifeworld perspective grounds the research the focus is upon what is shown to an individual person, in this case patients and caregivers. It is mainly through peoples' experiences that we can get knowledge about their lifeworld (Giorgi, 1985; Dahlberg et al, 2001). All participants took this situation seriously. Both patients and caregivers expressed that they gladly would share

their experiences and they all spoke very freely of their inner most feelings and experiences of care in technologically intense environments.

Validity

Research findings should be trustworthy and every research study must be evaluated in relation to the procedures used to generate the findings (Polit & Hungler, 2005). In the results of the articles II-III, the deeper and underlying meanings of data were described. Quotes from the interviews were given for reasons of clarity and illustrating the analysis but also in order to maintain validity. From this perspective, the very ambition to eliminate subjectivity is impossible. The solution is not in the elimination or covering up of subjectivity, but rather a clarification of the conditions in which human subjects gain valid knowledge (Giorgi, 2002). According to Giorgi (2002) the descriptive phenomenological method implements this strategy. When a phenomenon is described as a lived experience Dahlberg et al (2001) state that there is no obvious and 'correct' rule as to how to test the validity. The theoretical frame for this thesis is phenomenology and a reflecting lifeworld approach, where an important criterion for validity is the strive to go to the things 'themselves'. It is by constantly keeping the phenomenon in focus and by being open and pliable and letting the things show themselves in their richness that credibility and validity are shown. I have striven to be open and pliable during all the phases of this research; in planning the studies, collecting the data, analysing the data and in showing the results. Apart from the methodological approach and the scientific standpoint, the conducting of the research is vital for the validity of the results. I have striven to explicate thoroughly all the stages of the research process, where reflection has been important to sustain openness.

While doing research, there are many directions to be followed and choices to be made. Validity is about the scientific value of a lifeworld research study (Dahlberg et al, 2001). The goal within phenomenology is not to try to eliminate subjectivity, but to try to clarify its role when correct knowledge is attained. The point is to try to understand the conditions under which valid or correct knowledge can be obtained (Giorgi, 2002).

Bridling

Bridling is a crucial criterion for validity. The researcher's pre-understanding, presuppositions, and assumptions are inevitable, but still, they can not be allowed to 'take over'. Research is a process, in constant movement. So, how did I bridle? To understand another person you have to start within your own lifeworld. The challenge is not to stop there. To completely bracket your process of understanding is not realistic. Instead I tried to take a controlled approach and attitude to my research, thus bridling my fore-understandings and assumptions of the phenomenon. This is in order to prevent them from influencing the data collection and analysis. During the research process I have actively stopped to reflect, both on my own, but also together with my supervisors and at seminars. In the interview situations, I endeavoured to avoid posing leading questions but to allow the participants to freely narrate their experiences. During the interview dialogue follow-up questions were posed. For instance "Could you give me an

example", "How do you mean?", "Could you explain a bit more?", "How did you feel about that", "Can you describe that in more detail?" etc. The interviews were thus characterized by openness and pliability. Bridling was used through out the research process, as well in collection of data as in the analysing process. The effort to bridle your understanding is the condition to describe the structure of the phenomenon in its richness and versatility.

Since I have not worked as an ICU nurse regularly for the last 5 years it was easier for me to avoid assuming the role of the caregiver when interviewing the patients. It is neither possible nor desirable that the interviewer is completely without knowledge of the phenomenon which is the subject of the study. The fact that I am a trained and experienced ICU nurse, I think, was a necessary prerequisite for effectively studying in depth critically ill patients and their caregivers. However, to some degree, it influenced the interview situation, but this is not solely a bad thing. What is important is that the pre-knowledge is recognized, and does not block new information. I have been away from clinical work long enough for some things to have changed to the extent that I actually did not know. Interviewing about experiences that may involve strong feelings can be a delicate matter. My background, however, helped me to reach a depth in the interviews by 'knowing' or 'sensing' which follow-up questions to ask. I was also confident talking to the patients of their inner existential questions, since this has been part of my professional work for many years.

Generalization

It is valuable to give a clear and distinct description of culture and context, selection and characteristics of participants, data collection and process of analysis. A rich and vigorous presentation of the findings together with appropriate quotations will also enhance generalization or transferability. There is no single correct meaning or universal application of research findings, but only the most probable meaning from a particular perspective. With regards to reliability; are my results replicable? More accurately the question would be; is it possible to generalize from the results? If a research result can not be generalized outside your own context, is it research? What interest does it have unless someone else can benefit from the results? In this thesis the results have been lifted to a level that makes it possible to apply it on other ICUs. It is possible that these experiences even may be valid to other technologically intense environments than ICU. It is reasonable to assume that the meanings described are important for several caring situations (c f Giorgi, 1997; Dahlberg et al, 2001). According to Gadamer (2004), however, the knowledge must be used in order to form an opinion upon its applicability.

The use of language

Language is fundamentally part of our humanness. Heidegger (1971) proposed that language, thinking and being are intertwined and that lived experience itself seems to have a linguistic structure. Phenomenological descriptions are mainly mediated through spoken communication, i e, they are language-dependent. The means is to try to capture the complexity and ambiguity of the described. The

'phenomenological imagination' can help in expressing these complex phenomena. Metaphors may be useful and may help us to keep close to the phenomenon as it is lived, thus enabling us to see how the humanity of the ill extends the worlds of illness and health (Kestenbaum, 1982). When 'new' phenomena are discovered, they still have to be described in 'old' terms. To give rich descriptions of these 'new' phenomena, metaphors can be used. This may be a disadvantage because the scientific tradition, which phenomenology wants to go beyond, has influenced language. Even so, it is a possibility. I have chosen to use the full potential of the language and some of my descriptions may be considered to be metaphors. The use of metaphors in this thesis has its ground in the language limitation to describe certain dimensions of the phenomenon under investigation. The figurative descriptions have been used trying to make visible what was not previously seen. However, every metaphor and description have been chosen very carefully and used "with full respect to the phenomenon" (c f Dahlberg & Dahlberg, 2004, p 272).

# of results

Medicine as a modern and post-modern profession hooks its star to the double-coached wagon of natural sciences-technology as the 18th century wanes (Foucault, 1989). At length, it transmutes into a positive, empirical, objectified and mathematically precise discipline with its own mode of clinical seeing. Having made this commitment, medicine would ever after partake in the glorious success of 19th century science, but also stand accused of harbouring the blight of this historical 'moment', nihilism (Nietzsche, 1982). In our millennium, we inherit a legacy of divisive value judgments. How do we juggle the seemingly impossible dualism: commitment to medical technology versus commitment to individualized personal care? Sandelowski (2000) describes technology as a case of conflicting paradigms and, in so doing, she also relies on Cartesian epistemology. She argues that technology is minimizing the nurse's role as empathetic 'toucher' and, furthermore, the nurse is becoming like a physician in that they both only touch the patient to obtain objective information (Sandelowski, 2000; 2002).

Nursing literature continues to be dominated by a preference for making grandiose claims about the efficacy of technological development, for fashioning vague pronouncements about the development of nursing practice, and alluding to unsubstantiated evidence concerning the way in which technology influences nursing care and favours an uncritical approach to technology in which the phenomenon is understood to be little more than machinery and tools (Barnard, 2006). A question that needs an answer is whether the discourse of difference surrounding technology is preventing us from recognizing the technique that can undermine humane care. Concern and respect for individual human beings may be sacrificed in favour of technical efficiency when choices have to be made (Barnard & Sandelowski, 2001).

Insofar as the attitude of technology, Gestell, dominates, the patients question the sincerity and doubt the genuine interest of the caregiver. Thus, a

heavy burden is put upon those individuals already compromised by a critical or life-threatening medical problem. Care giving is a human act. As humans, we have emerged from an absolutely dependent state as prematurely born infants. Our imperfectly loving 'mothering ones' have provided 'good enough' consistent reliable care. Thus, most of us are ready to give ourselves over to the professional caregiver. Truth be told, we have also been socialized to over-evaluate the competence of medical personnel. Nowadays, humans are also indoctrinated into the wonders of technology. Here is the burden. Technology has usurped the human touch and the bedside manner of the physician. So blind trust in technology is supposed to inspire confidence that one will be safe and eventually healed. Perhaps it is the knot of irony in medical health care, especially in the ICU. The System absolutely requires that patients surrender to its ministrations, to its latest technological wonder tools. And the more unreflected the surrender, the better. Nothing constructive happens if the patient 'fights' her cure. Yet, in our modern/postmodern hospital, one's trust that one is safely in 'good hands' soon becomes strained. Increased dependency warps the link between the patient and the caregiver. The more the lights flash, the bells ring, the lines on the machine wiggle, the more vulnerable the patient feels. Eventually, the trust falls short and the patient feels deserted. Sandelowski (1996) found that some nurses depict themselves as monitoring devices which, instead of watching over the patients watched over technology and ceased to use their own sensitivity and ability of interpretation.

Knowing the machine or knowing the patient?

The first strophe of Johns' poem, "broken" (2005, p 150) describes the predicament of the patient made to feel invisible by the too prominent machine:

> The young face lay there.
> Her clear blue eyes searched in vain
> to catch the eyes of the one dressed in blues;
> In vain, because the eyes of the one wearing blues
> were averted, fixed as they were, on the machines
> to which the young face's body was attached.

Machines are predictable, humans are not. My patient-informants lodged complaints against the inextricable dependency of intensive care upon technical gadgetry. Equally, they bemoaned the effect of the medical gaze. What leads to the ambivalence and contradictions that patients experiences and sensitive researchers observe? At root is a structural problem. It is a problem of seeing. In my data, rarely do caregivers meet and match the patients' need to talk about their predicaments. Instead, caregivers filter communication indirectly through objective data: a diagnosis, a list of symptoms or the readings of instruments. Thus patient-caregiver interactions vibrate off kilter, indicating participation in illness mostly at the technical-mechanical level. Caregivers flaunt their specialty but hide behind routines and structures. With deep needs and anxieties unaddressed, and reduced to a nameless number on a plastic bracelet, the ICU patient feels lost and uncertain how to (re)act. Ambivalence prods the patient to strain

harder to adjust to assumed caregiver expectations. In what is a wilful misunderstanding of the mandate at hand, the patient wishes to relieve the caregiver's burden. It is not supposed to be that way. It is counter-therapeutic. Nyström et al (2003) reveal an adaptation to organisational demands for efficiency, on the part of both nurses and patients. This form of adaptation seems to constitute a precondition for well-functioning emergency care settings. When we are ill, our body, our thinking and the world is 'out of tune', coloured by experiences limitations and feelings of pain, weakness and vulnerability, thus making the illness a form of 'homelessness' or 'un-homelikeness' (Svenaues, 2001). In their efforts to find 'home', the patients strive to adapt to the culture. A serious consequence is that patients become dishonest with themselves and relinquish all intentions of being a part of their own health process (ibid). The conflict the patient experience with the environment is largely caused by the behaviour of the healthy visitors or caregiver. The question 'How is everything?' is just as conventional as the gestures by which the visitors put their coat over a chair. The visitor barely expects a reply and the patient cannot fail to notice it. His words hardly reach the visitor who already 'knows' how the patient is (van den Berg, 1972).

Modern technology has a definite place in nursing practice, but as a supplement to and not a substitute for the art of healing. The art is working with nature, not attempting to surpass or replace it with technology (Mitchell, 2007). Technology is not responsible for the depersonalization. The overall most important factor is the meaning that is attributed to technology and the potential of technique to emphasize efficiency and rationale order. Like technology, humane care is itself a socially-constructed entity. The role of tools and instruments in our relation to the earth is culturally embedded. The focus on technological intervention renders the human relationships neglected, judged less important and more dispensable, than the necessity of high-quality technical work. Apparatus, laboratory results and scanners become the centre of attention and replace conversations with the patient (Callahan 1993).

There lies a danger in rendering the personhood of the patient more redundant or insignificant. The technical equipment is inevitably directed at investigating and supporting with biophysical phenomena, not with lived experiences (van der Riet, 1997). "Technology and technological environments have the potential effect of disconnecting the person from the body, particularly in environments where the whole ambience is constructed around the technology" (ibid, p 100). What happens to a person who is not seen? The caregivers do not see, the next of kin (if any) do not see. Maybe (s)he is non existing? The caregiver gets close to the patient but does the patient get close to the caregiver? Closeness is not just a matter of physical position. Sandman (2001) agues that if the personnel tend to lose focus on the patient, the patient would get even less attention than if there were no machines to monitor in the room. The machines might at least give them a reason to enter the patient's room. Still, without technology we can easily find other excuses for not attending to the patient. The focus of attention of the health care personnel seems to depend more on the attitudes of the personnel than on the use of technology (ibid).

Information should tempt all senses

It may be common practice to stand at distance in order to interpret and assess the progress of care. Consequently the potential for compassionate understanding, less opportunity for subjectivity and a diminished need to 'get to know' the person is reduced. The subsequent distancing smoothes over individual uniqueness and subjective experience. Body parts are displayed for the observer as a series of graphs and functions. The spectator retreats from the body in order to know it, not as a whole, but as its compounded parts that are displayed (Barnard & Sinclair, 2006). Screens record numbers and lines relate to a graph. The vital signs, the real vitals signs, may be missing even though the spiked 'reading' is superfine. From a Cartesian understanding of symptoms, the mind receives and interprets the impressions and sensations from the body. Physicians may thus view symptoms as subjective interpretations of the body's real disease. The mind is considered less reliable when it comes to reporting symptoms than those that can be documented objectively with medical instrumentation and measurement (Benner, 2001). Focusing upon a purely visual environment gives the impression of control and objectification, but multi-sensory dimensions remain constant even if the practitioner is not attuned to them. Observing a cardiac monitor puts the spectator's focus on an isolated body part, enhancing the experience of visual pre-eminence. If these solely observing actions lead the practitioner to return to the person to ask how they feel, they have made a purposeful choice to focus on the person through other senses. If the caregiver does not return, (s)he has then made a choice to take a distance from the patient and to reject alternative senses. By that creating an illusion of control whilst simultaneously risking its loss (Barnard & Sinclair, 2006). If used too exclusively, this one-sided viewing may render patients invisible.

There has been a transformation; a shift to vision and its reduction to a certain kind of vision (Ihde, 2002). More physiological, biochemical and radiographic data is collected from ICU patients than from any other group of hospital patients (Clutton-Brock, 1996). Gadamer (1996) acknowledges the tremendous advances made in modern, technical scientific research but also admires the thoughtful medical practitioner who genuinely listens; who takes the patient and her or his life-experiences as more than an inventory of symptoms; who is able to guide the process of healing without unnecessary prescriptions. Appropriate medical treatment is more than mere 'mastery of craft'. The genuine dialogue between doctor and patient must be seen as part of the treatment itself and as something which remains important throughout the entire process of recovery (ibid).

Checking the screen to make sure the top line does not go flat is indeed the bottom line in a situation of critical or life-threatening illness. However, that serious monitoring does not have to obscure the nurse's sensitivity to see the suffering human who is terrified by what the waving line on the screen might forecast.

In the modern ICU, the visual has become the 'truth' and it exceeds the value of the audible, e g, what a monitor shows is more 'true' than the patients story. Medical technologies used to be more auditory that visual (Sandelowski,

2000). Accumulated success of photographic imaging is described by Holtzmann Kevles (1998) who claims that in the late 19th century the photographs became standard for objective and scientific truth. Advances in technology permit a much more penetrating, in-depth gaze of the physical body (Cassell, 1991). The gaze transforms the body. Caregivers tend to see only an outline or small part of the person rather than the whole individual (Barnard & Sinclair, 2006).

What became obvious in my empirical studies was that the patients felt marginalized. Is technology neutral? If so, is nursing? Who discusses the neutrality of caring? Is neutrality an important issue? Technology is something alien that is imposed on our 'naturalness' (Heidegger, 1977) – But what is natural about being hospitalized? Heidegger (1977) argues that the use of physics and the scientific method must be seen as a technological method for understanding the world, a tool for the technological way of framing the world. Technology has become a systematic framework for understanding the world. As a consequence, the world is seen as standing reserve or a resource well, which is available to be consumed by technology. In other words, the natural world becomes an energy reserve for human instrumental technological use (ibid).

Vital signs are accessed via screens, machinery is increasingly a component of a patient's care and body systems are measured and assessed via technology. Practitioners step away from the people (bodies) to make judgements about ongoing care. The technology embodies a sense of control, of taking charge, of being with, but at the same time of being distant (Barnard & Sinclair, 2006). If we perpetuate this way of knowing that gives primacy to objective and detached knowledge, nursing epistemology will contribute to an impersonal health care system in much the same way as the biomedical model has (Walters, 1995).

The patient undergoes a change in existence and, in a way, ceases to be in charge of her or his existence. The patient needs care, and is put in a dependent position. No matter how independent or dependent the patient had been prior to the illness or accident, (s)he is more needy after becoming a patient.

Ambiguous and non neutral

Machines are so important you need a 'licence' to handle them and a yearly refresher course. The machines themselves tell you they are important by shouting louder than the patient. Patients attest to the importance by becoming mute. Commonly the nurse will fix an intravenous infusion pump or leave a patient to answer a telephone instead of spending time with her or him. When the ventilator malfunctions, she quickly employs the technique for ventilating by hand. But she is much less ready to meet a person in distress with a comforting touch.

The situation erodes the caregivers' sensitivity and ability to interpret. Instead of watching over the patient, caregivers watch over technology. In technologically intense environments, caregivers fuse patients and apparatus into one clinical picture. Caregivers so strive to master technology that the patient ends up an object of observation, supervision, review and control. Thus, the nurse must face the stark reality: to choose and to act. She must act with ambiguity as her constant companion.

As soon as one clarifies the assumptions underlying nursing care, the keen vigilance over technological devices, documented data, laboratory results and measured parameters need not exclude focused and empathic attention to patients' stories and experiences and to the full complement of their human registers.

Ambiguity abounds in the modern/postmodern technologically intense environment. Ambiguity means that something can be correct from at least two perspectives, and that one might ooze complex emotions connected to each viewpoint. In ambiguity, one is conscious precisely of the 'objects' or the matter at stake. The capacity to tolerate ambiguity requires intelligence and maturity (Merleau-Ponty, 1964a). In ICU, it is very concrete. The machine does not need to dominate the 'clinical gaze'. A patient does not have to be interpreted according to the readings of the machine. Care and technology are not inherently at odds. Nursing personnel might imbue whatever they do with a caring touch that senses, understand and respond to the other's suffering (Johns, 2005).

Is the ambiguity related to the fact that technology is non neutral? Ihde (1990) approaches the diversity of human-technology relations that shows the extent to which technology is non neutral. The material relation between humans and the world should be conceived as a symbiotic and mediated relation instead of as a divided and instrumental one. A technology has a large number of ways in which it can be used, not restricted to what designers intended or what is thought to be the outcome. Any given technology will end up having different kinds of uses in different kinds of contexts (Ihde, 1993).

Insofar as technology drives treatment and co-shapes care giving attitudes, it compromises the caregiver's vision, impedes any possible close encounter and sabotages the intention of developing health-inducing interpersonal relations. Focus lies on technology and the optimal balance between objective distance and interpersonal closeness is skewed. Although competent supervision stabilizes the biological body, nevertheless the patient feels marginalized. Wanting to fit in, to acclimatize to the System demeans and diminishes the patient's humanness. Patients feel like biological units, like an exemplar of some diagnosis. Technology is being served, not another human being. Under the domination of Gestell, all beings whatsoever are disclosed as stock or resource: objective, calculable, quantifiable, profitable or disposable (Heidegger, 1993, pp 311-312).

The myth of the neutral tool

Machines are not only tools. It has been argued that machines are partly autonomous (Gjengedal, 1994). Man's role as a master has been taken over by the machine. In a way, man seems to lose control of her/his own inventions. This fosters the ambiguity. Tools do not do anything themselves but they are resources for the skilled personnel. Technological tools in the ICU are performing the work of different staff members, they regulate infusions and drug injections like the injection pump, the drip counter and the ventilator (Wikström, 2003). Tools are nothing but tools. And medicine and machines are minor tools, as soon as one recognizes that the major tool is the tool-user; the caregiver who speaks and listens, who draws near and touches, but who also sees from afar and acts with appropriate distance. It is a subtle dialectic of closeness-distance, of I-It/I-Thou (Alapack, unpublished manuscript). Technologies transform human experience.

Machine contact, however, can be regarded as neutral in the sense that there is nothing reciprocal about it. "For the sick person, interactions with the machine evoke only frustration, intimidation, or the strangeness and awkwardness of finding ourselves plugged in" (ibid).

Ambivalent and absorbed

The striving after efficiency for efficiency's sake, Gestell, is the efficiency that make technology rule the hospital milieu and that make it possible for technology to enslave the caregivers. That makes us treat 'bad' strips, not sick patients. In the classic Hegelian sense, master-slave dynamics rule in the technologically intense environments.

Prosthetics have become common in our time. Western culture is undergoing a transformation in the way it views embodiment. The media glut of images of bionic and cyber bodies insidiously lead to an odd identification with them. Technology becomes both a representation and an extension of the person. Technology is thus co-creating the way we interpret ourselves conceptually depict the world.

Technology rules the hospital milieu. Caregivers as well as patients take for granted the machines in the ICU, but rarely discuss their invariant and alienating impact. Giving-oneself-over and trying-to-be-a-good-patient, promotes the sense of safety. On the other hand, it renders one extremely vulnerable. Humans tend to interpret themselves in terms of technology by claiming that a rhythm strip observed on a cardiac monitor is my heart and that urine in a catheter bag is my urine (Barnard and Sinclair, 2006).

Nurses in acute settings are focused on the machines, not the human being who is out of balance, equilibrium (Mitchell, 2007). Wikström, Cederborg & Johanson (2007) found that caregivers described technology as a tool embedded in caring activities, integrated as an essential tool when performing their work. This may be the imbedding that in my thesis reveals itself as a lack of reflection.

The aim of care is not to immediately 'fix' the person who is out of equilibrium but focusing treatment on the whole person, seeing illness as a life-world disturbance as well as a biological disturbance, supporting the person's natural healing processes and withdrawing when appropriate (Gadamer, 1996). The practice of the art of medicine is not merely the application of generalized rules, but the art of healing is to restore what has been disturbed, and to do so in such a way that the art can allow itself to disappear once the natural equilibrium of health has returned (ibid).

The lived body can be overlooked because experiences cannot be technologically monitored (Walters, 1995). It soon becomes evident that the 'good hands' into which one has put one's life turn out to be mostly an extended arm of technology. Blind trust in technology ultimately does not inspire confidence in safety and eventual healing.

The technology standpoint dictates and locates the caregiver atop and patient at the bottom rung. The patient and the apparatus are compared to create a unit, a unit consisting of parameters and results to be regulated and read. Tech-

nology can magnify the objective aspects of human life while reducing the sub-
jective qualities. It is vanity gone amuck and our hubris to imagine that we can
control technology. Technology is the perennial human possibility of creating,
building and bringing forth. In our age, it shows as virtual reality, cyberspace, in-
formation highway, etc. Technology is coincidental with life (Heidegger, 1993).
As individuals we adapt to life in a technological environment and our subjectiv-
ity is shaped and formed by the technological mode of life. Is there a deficit of
awareness?

Kelman (1973) contends that closeness to the centre of power and deci-
sions makes the nurse identify with the authority system and is swept up by glory
and mystique. In a highly technologized ward such as an ICU, all eyes, even the
family members are focused on the machinery, not on the patient. In part, this is
the seductive power of technology "It requires effort not to watch the monitors.
Technology -machines, instruments, drug treatments - like blinkers on a horse,
restrict and define and thus simplify the viewpoint" (Cassell, 1991, p 22). The
essence of technology pursues efficiency not for the sake of the products it will
bring forth, the money it will generate or the power it will garner; it seeks effi-
ciency to be ceaselessly efficient (Heidegger, 1977). So easily it spins out of con-
trol and proliferates, that it blurs the radiance of all other ways of coming-to-
presence and swallowing other values. When the caregiver lets herself be ab-
sorbed by technology so easily the ambiguity decays into ambivalence. The
caregiver stops juggling the technical dimension of care with the human side of
nursing - and splits.

Technology, a matter of life and death

Van den Berg (1972) calls death a symptom of life. He further claims that to
deny a person the right to contemplate approaching death actually means deny-
ing him the right to see his life as a whole, to live it as a complete life. However
near the visitor might be, (s)he can never completely abolish the distance and the
strangeness. (S)he is healthy. There is a gap between the sick and the healthy
person and this gap has a frightening depth when the sick person knows or seri-
ously expects that his illness is going to be fatal (ibid). In the ICU, death hovers.
The business of intensive care is life and death. However, technology looms as a
conspicuous, imposing and dominant presence. Heidegger (1993) claims there is
an ineluctable connection between technology and death, and he takes to task the
entire history of Western philosophy for never giving death its due. What is the
complex story between technology and death? Western denizens share in the
conspiracy of silence about the only true 100% objective fact: we are going to
die. We indulge instead in TV images of pools of blood at the murder-scenes;
violent movies and video games - the social-cultural anesthetization of death's
sting. The medical credo is life. Western culture is death-denying. But doctors
and nurses by profession are death-merchants, like it or not. Their education and
maturing into their profession is to make peace with matters of our existence. To
the degree that they ignore it in intensive care, treatment fails. If basic human
condition of life/death were to take central place the medical-nursing profession
would mature and promote balance between the technical and caring.

Death mocks the ache to heal and the drive to eliminate pain. The status of the patient must be gleaned from screens and other objective parameters. Thus, within the health care system of today, 'bad' laboratory test results are being treated, not sick patients. But a vicious circle ensues. The sharpness of technological vigilance makes the patient feel personally invisible and marginalized. And caregivers act as if they are 'stuck' in handling technological devices by routine, solely manipulating buttons and technological adjustments. The beginning of every serious illness is a halt. Normal life is at an end. Another life takes its place, a life of a completely unknown nature. The certainty of death may even make life very much alive (van den Berg, 1972). Caregivers perceive themselves as passive objects, victims of technology. Thus, patients treated with machinery are then also seen in an objectifying and mechanical way (Lindahl, 2005). One of the most fundamental characteristics of the sickbed consists in the isolation of the patient. Life goes on but he no longer takes part in it (van den Berg, 1972).

I do not wish to axe out medication and technology. The Respirator or the Pacemaker deserves respect and gratitude. They have constituted a boon to the social milieu. We both need and want what technology can generate. But we do not want the obsession out of it (Alapack, unpublished manuscript). What, after all, is the adequate index of experiences of suffering and pain? My age is irrealizable, de Beauvoir (1993) demonstrates, more visible to the other than it is to me. But, my pain is invisible to the other; it is pre-eminently personal. Nobody can know my pain as well as I do. The patient utters the word under his breath: they are passing the buck. We all fear death and illness. But we do not talk about it, neither to others, nor to ourselves. We escape from this discussion by acting as if illness and death did not exist. A patient may try to discuss the matters of death - for only a discussion can bring greater clarity to his thoughts. But he finds that no one can help him; often not even his doctor. Every healthy person frequently prefers a false optimism. An optimism that shut the sick person out, he has simply ceased to be a part of the life outside the hospital. He is a non-participant – he is just a patient (van den Berg, 1972).

Time is a python

Technology can positively and negatively shape a nurse's available time to establish a caring relationship (Barnard, 2006). In 1996, Clutton-Brock found that up to 70% of intensive care nursing time is spent recording data from monitors, from the laboratories and from clinical examinations. There is little reason to think this time spent is less now, 10 years later, when even more apparatuses has entered the arena. The time and energy consumed by the machines might, on the whole, be worth it if the patient benefits from the use of these machines (Sandman, 2001).

Patients, who have been critically ill, have a need to talk about their experiences (Löf et al, 2006; Elmqvist, Fridlund & Ekebergh, 2007). Letting the patients share their experiences takes time. The patient is stranded on a timeless shore (van den Berg, 1972). Time is a python in the ICU. Clock time is at a premium. Clock hours are squandered caring for machines. Caregivers complain

about lack of time and space for existential matters in their daily routine. They express frustration that the treatment milieu is not conducive to undisturbed talk. Quality time, inherently immeasurable, is necessary for listening to patients. But listening in this context is not just being idly attuned, one must listen to capture how the patients really feel and what care they want and need. Not measured duration but the sharing of living time develops the deeper truly care giving relationships. In this regard, 'babysitting' technology impedes any possible close encounter and sabotages the intention of developing health-inducing interpersonal relations. It compromises the caregiver's vision. One risks forgetting the patient as a human being by placing too much trust in technology. What is supposed to be a useful tool, again, turns into an impediment to encounter and emotional contact. The human touch is not a luxury in the hospital setting; it is cost-effective. Why can not care take time? Why can not touch take time?

The caring relation

From Merleau-Ponty's (1962) standpoint, we as flesh are seen-seers, heard-hearers, touched because we also touch. Dualisms are thus cancelled out. In the matter of clinical observation, seeing must not stop at the monitor. The caregiver must look behind the numbers on the screen to see the person. We can look at the patient with double vision, not look as if a Cyclops. "But where danger is, grows the saving power also" (Heidegger, 1993, p 333).

Like technology, medicine ultimately does not produce anything itself. The physician's real task is to assist in the process of restoration and recovery of health (Gadamer, 1996). Medical practice, as well as technology must be seen as supporting whatever helps to restore or sustain balance. Our knowledge and technical abilities have reached a point where they now represent an attempt to surpass nature. The restoration of health depends not simply on the production of an objective state of being but also on careful intervention and guidance toward a return of equilibrium in the patient's life as a whole (ibid). Is not evoking humiliation the antithesis of care? By itself, objectifying observation retards healing.

Caring creates possibilities. Even the positive effect of medicine is never just a chemical matter. It is relational too, directly related to the physician-patient relationship. Brain-related practical skills, meshed with the skill to care from the heart, would form a unifying hyphen not a splintering slash (Alapack, 1996). The modern medico-technical caregiver considers the association with the patient of secondary importance. Instead he relies on the science of anatomy, physiology, chemistry and all the other 'discoveries' of the history in the discipline. This is not wrong, but it is incomplete (van den Berg, 1978). The human face of the Other calls me to care (Levinas, 1989). Illness or injury can disrupt and even shatter one's taken-for-granted world. Hence, recovery does not only come from curing the body, or repairing the injury. It is also a question of restoring the integration and functioning of the embodied self in the person's own particular world (Benner, 2001). Only if the caregiver takes into consideration the specific individual's lifeworld care genuinely is experienced as supportive (ibid).

Thus, it is not processes, procedures or machines, per se, that support, but the caring relation.

Fear, anxiety and suffering can overwhelm a nurse and consequently emotionally wear her or him out. Getting too close to the patient may lead nurses to distance themselves emotionally from the patients and their families (Cronqvist et el, 2001). However, allowing oneself to get close, may very well give strength. Emotional closeness can also give sight with which to see the patients' needs and may evoke far more caring responses than only seeing with the mediation of machines, across a wide experiential distance. Nyström et al (2003) found that encounters with negative outcomes were found to be characterised by the carer's absence. The carers felt uncomfortable and were too afraid to remain close to the patient. Consequently, patients became nothing more than the object of certain actions while, at the same time, the carers were unable to respond to the patient's real wishes (ibid). This view of nursing is rooted in the assumption that the technical and mechanical aspects of nursing are 'real work' and would help nursing to be recognised as a distinct discipline. In this tradition the 'basic' nursing care is seen as low status, less important than the technical tasks and can be done by anyone. Other nurses believe that the 'basic' nursing care is equally important and is what the nurse is there for (Alasad, 2002). Technical activities therefore, are seen as an extended role for the nurse and not the primary one.

There is an inherent ambivalence about the role of the nurse and essence of nursing. It brings home the traditional questions whether nursing is an art or science and whether caring is the essence of nursing (Alasad, 2002; Bull & Fitz-Gerald, 2006). The caring relationship is a nourishing relation between people, especially between patient and caregiver. The caring relationship is also a sign for professional commitment, which presume that the caregivers use their personal knowledge and experience to offer an absolute presence as an asset in the caring encounter. The caring relation can be caring and non-caring (Carlsson, 2004). The caring relation is also related to the relation between the nurse and the physician. A poor relationship between caregivers can create doubt and keep them distant from the patient (Lindahl & Sandman, 1998). If the caregiver is too hurried or too task-oriented to notice the patient's and families' experience, then the level of disclosure will be constrained. Likewise, the caregivers' attunement and engagement with the patient allows them to notice subtle changes. Touch and other physical and emotional comforting measures are central to creating safe disclosive spaces where the patient and the caregiver can meet (Benner, 2005). This involves good relational ethics and skilful ethical comportment. The nurse-patient relationship sets up the conditions of possibility for patients to disclose their concerns, fears and discomforts. Care giving relationships may open up possibilities, or close them down (Benner, Hooper-Kyriadis & Stannard, 1999). According to Benner (2005) comforting a patient includes providing social, emotional, physical, and spiritual support for the patient. Seemingly soft sounding realities such as comfort, solace, being present and available and touch are curative, even life-saving to a person in distress. They are part and parcel of the art of nursing. These phenomena get trivialized in a setting focused on highly technical curative techniques. Touch is invisible, almost never charted or rec-

ommended in a nursing care plan. If we are going to 'pet' the machine, we must also 'pet' the patient.

Is the discourse of difference surrounding technology preventing us from recognizing the technique that can undermine humane care (Barnard & Sandelowski, 2001)? Asymmetry between patients and caregivers is typical of hospitals. Most often the patients do not have any choice when they are admitted to the hospital, the caregivers work there of their own free will. The technological development has made the hospital environment even stranger, increasing the asymmetry, particularly in ICU (Gjengedal, 1994). The phenomenon of care captures many aspects of human engagement in a lifeworld. Benner (2001) considers it a phenomenological paradox that caring both constitutes, and is constituted by, a person's lifeworld. Nevertheless, caring shapes a world, and allows other beings to be noticed.

Further empirical research concerning the relation between technology and caring is needed. Interventional studies within the technical intense environments would also be valuable such as studying music therapy from different approaches. Communication in relation to technology within this field would also be an interesting research question. How does communication take place when technology is partaking in the relation? And how do the next-of-kin experience technology within the technologically dominated context? Observational studies might give yet another dimension to the interaction patient-machine-caregiver.

In terms of the lived body and the philosophy of Merleau-Ponty it would be interesting to explore the relation between the patient and the surrounding artefacts. Does the bed become embodied when the patient is bed bound? What is the relation between the patient and the machine? Does the machine become an extension of the patient's body?

Then there is the aspect of time. What is the meaning of time in ICU? Both from the patient's and the caregiver's perspective? Why cannot caring take time? Why does there seem to be constant lack of time? A lack of time to care. There is also a need to reach a deeper understanding about how the caregivers can deal with the ambivalence and how to avoid being absorbed by technology.

The findings of this thesis indicated that 'someone else' is supposed to solve the problems or situations that occur. 'Someone else', being other clinics or hospitals. It also seemed that laboratory results and X-ray, results that come from outside the ICU is more reliable than what is right before the caregivers' eyes. The monitors and the patients themselves. This 'authority by distance' is yet another field for investigation.

CONCLUSIONS

Blind trust in technology is supposed to inspire confidence that one will be safe and eventually healed. The System absolutely requires that patients surrender to its ministrations, to its latest technological wonder tools. The more unreflected the surrender, the better. Nothing constructive happens if the patient 'fights' her cure. Yet, increased dependency warps the link between the patient and the caregiver. At root is a structural problem, it is a problem of seeing. Rarely do caregivers meet and match the patients' need to talk about their predicaments. Instead, caregivers filter communication indirectly through objective data: a diagnosis, a list of symptoms or the readings of instruments. Thus, patient-caregiver interactions vibrate off kilter, indicating participation in illness mostly at the technical-mechanical level. In the technological milieu, the deeply subjective issues about illness lack a place. The caregivers do not deliberately ice out existential dimensions. Technological routines are by nature one-dimensional and therefore shallow. Insofar as they control most of the caregivers' time and attention, they overlook the patient as a unique person and fail to notice idiosyncratic worries. Technology is being served, not another human being.

The flaw is not turning to the device, per se, it is the turning away from the person. Technological precision and care are both of indispensable value. They must be integrated. The way to value them equally, is to understand their essential belonging-togetherness. Polarization is an intellectual and practical dead end. It does not suffice to complain that caregivers feel pinched between caring and monitoring technology. The enlightening act is to stop the polarization and to heal the separations, the divisions, the antinomies. In the high tech wards, nursing and technology are equal values, indispensable to one another. The machine, to have any worth as a tool, requires human expertise. No machine can solely replace the art of healing.

Still, focus lies on technology and the optimal balance between objective distance and interpersonal closeness is skewed. Although competent supervision stabilizes the biological body, nevertheless the sharpness of technological vigilance renders the patient invisible and marginalized. Technology drives treatment and co-shapes care giving attitudes to the extent that it may impede any possible close encounter and sabotage the intention of developing health-inducing interpersonal relations. Caregivers need to be aware that the roar of technology silences the subtle attempts of the critically ill or injured person to give voice to his or her needs. If subjectivity fails, if the patients story is less worth than objective 'facts', potential dialogue deteriorates into monologue and sheer information.

However, armed with a double skill, the caregiver can decide what needs to be isolated and addressed as a specific problem, and what requires assemblage into a human whole. The challenge for caregivers in technologically intense environments, such as ICU, is to know when to heighten the importance of the objective and measurable dimensions provided by technology. And when

to reduce the importance of the objective dimensions and magnifying the patients' lived experiences. The caregivers must act with ambiguity as their constant companion. To live with the ambiguity of the technical dimension of care and the human side of nursing and to not let ambiguity turn into ambivalence is no easy task. It takes reflection, courage and support. Gradually our faith has been eroded in our closest 'instrument' – ourselves – our hands and our heart. Machinery is useful tools, but technology can never replace human touch, closeness and empathy. It is a question of harmonizing the demands of subjectivity with objective signs. The split between caring and technology is arbitrary. Both are powerful 'tools' to cure. The ICU needs to be technologically sophisticated, state-of-the-art, but also needs a disclosive space where solace, trust, and reassurance naturally happen.

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I dedicate this thesis to the future, my nieces, Amanda Almerud and Lina Almerud.

SUMMARY IN SWEDISH

Övervakad & Osedd - Vård i tekniktäta miljöer

Vården på en intensivvårdsavdelning innebär frekventa medicinska kontroller och observationer samt en rad omvårdnadsåtgärder såsom rensugning av luftvägar, vändningar och personlig hygien i en miljö starkt präglad av teknisk utrustning och täta medicinska kontroller. Kritiskt[1] sjuka patienter får ofta svikt i flera organ. Deras kroppar blir därför kopplade till en samling slangar och tuber som är anslutna till medicinskteknisk utrustning. Avhandlingens övergripande syfte var att studera innebörden av att vårda och vårdas i tekniktäta miljöer. För att försöka lindra patienternas obehag i samband med intensivvård genomfördes först en studie med syftet att undersöka om pågående musikterapi hade en mätbar lugnande effekt på intensivvårdspatienter som tillfälligt vårdades i respirator samt att efteråt undersöka patienternas upplevelser.

Musik är ett sätt att filtrera obehagliga och okända ljud som är kopplade till sjukhusvistelsen och kan på detta sätt minska behovet av lugnande läkemedel och leda till ett snabbare tillfrisknande. I interventionsgruppen sjönk såväl det systoliska som det diastoliska blodtrycket under pågående musikintervention för att sedan åter stiga efter avslutad behandling. Att musiken givit puls- och blodtryckssänkningen kan inte uttalas med säkerhet, men resultatet har givit en riktningsanvisning. Musik är en enkel, billig och säker intervention som med fördel kan användas i omvårdnaden av intensivvårdspatienter utan risk för oönskade bieffekter.

Uppföljande intervjuer med patienterna gav ett ringa resultat och den centrala frågan om hur det var att vårdas i en tekniktät miljö kvarstod. Omfattande teknologisk utveckling har skett de senaste decennierna, men det saknas forskning kring hur patienterna upplever denna utveckling. Min andra studie sökte därför svar på hur patienter upplevde vården i tekniktäta miljöer. Studien visade att teknikens starka stämma tystar patientens röst och blottställer vårdarnas kompetens. Trots att övervakningsutrustningen används för att säkra och upprätthålla liv, kan den även skapa begränsningar för patienten som får svårt att

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[1] Med 'kritiskt sjuk' avses här sjukdom eller skada med svikt i vitala organ där hot om livet föreligger.

röra sig och kanske inte vågar röra sig av rädsla för att kablar skall lossna och för att alarm skall utlösas. Resultatet av delstudie två visade vidare att kritisk sjukdom eller skada innebär ett akut hot om livet, ett hot som överskuggar allt annat. Instängda i en skrämmande och svårförståelig miljö, där teknologin slår an tonen, känner patienterna hur existensen perforeras och de känner en närhet till döden. En existentiell ensamhet uppstår när patienterna inte blir bekräftade i sitt lidande. Att vårdas i tekniktäta miljöer innebär en begränsning av och en bundenhet till apparatur, vilket ger en känsla av passivisering och instängdhet. Patienterna befinner sig, oreflekterat, i en tillvaro där teknologin tas för given och de fråntas kontrollen över sin kropp och sitt liv. Detta innebär ett frihetsberövande som också kränker integriteten. Den kritiskt sjuka människan kan inte själv påverka sin situation och autonomin blir beskuren. Patienterna ifrågasätter inte auktoriteterna utan sätter sin tillit till vården och lägger sitt liv i vårdarnas händer. Detta skapar, å ena sidan trygghet, å andra sidan känslan av att vara utlämnad. Vårdaren upplevs agera utifrån organen och deras funktion, som teknologins förlängda arm. Patienterna ser sig härmed bli objekt som ska övervakas. Genom att övervaka och avläsa såväl patient som apparatur, upplevs vårdarna ha god kontroll över den biologiska kroppen. Patienterna är iakttagna och övervakade, men känner sig marginaliserade som människor när teknologins starka stämma tystar den sjuka människan.

Den vårdande relationen förföll stå i centrum. Jag vände mig därför till den andra parten i vårdrelationen – vårdaren. Innebörden i att vårda i tekniktäta miljöer var syftet med den tredje studien, som kom till följande resultat; Att vara vårdare i tekniktät miljö kräver både hjärna, hjärta och hand. I en teknologiskt hierarkisk struktur där patienten står lägst, är det tekniska tongivande och dikterar såväl vårdandets villkor som vårdarnas hållning gentemot patienten. Vårdarens intention är att komma nära sin patient, men teknologin ställer sig emellan och hindrar mötet - den blir ett hinder för den mellanmänskliga relationen och fördunklar vårdarnas möjlighet att 'se'. Patienten och apparaten tenderar att smälta samman till en avläsbar enhet bestående av objektiva parametrar och mätvärden. Tekniken utmanövrerar vårdandet och tekniken distanserar vårdaren från patienten, som marginaliseras. Apparaturen invaggar vårdaren i fiktiv trygghet och säkerhet. Samtidigt är vårdaren vagt medveten om att teknologin inte ger en fullödig bild. Genom sin fängslande, spännande och utmanande karaktär 'förför' tekniken vårdarna, som oreflekterat dras in i det teknologiska nätet, oförmögna att ta sig loss. Handlandet och intellektet står i fokus. Men det finns även en emotionell dimension, där vårdarna anar något mer än det objektivt avläsbara. Trots den oreflekterade hållningen erfar vårdarna vilsenhet och känsla av otillräcklighet då apparaterna tränger ut patienten. Vårdarna kommunicerar till, inte med patienten och en monolog snarare än en dialog blir resultatet i mötet med den osynliggjorda patienten.

Den tredje studien visade således att inkonsekvens och ambivalens tränger undan vårdandet. Teknologin är tvetydig. Vårdarna känner en säkerhet i att objektivt kunna 'avläsa' patienten, men tekniska uppgifter överskuggar 'vårdandet'. Tekniska arbetsuppgifter blir en ersättning för närhet. Denna studie pekar på vikten av balans. Att teknologisk precision och vårdande båda är oumbärliga. Ingen maskin kan ersätta vårdandets konst. Det är inte teknologin i sig som

skapar avhumaniseringen eller avpersonifieringen. Det är snarare hur olika teknik används i olika kontexter.

En aktör kvarstod att studera; teknologin själv. Den fjärde delstudien var en teoretisk, filosofisk belysning utifrån de empiriska resultaten i delstudie II och III. Ingen apparat kan av sig själv skapa en alienering eller störa en vårdares intention att vårda. Det handlar om vår attityd till tekniken. Det är teknikens väsen, av Heidegger kallat Gestell, som stör balansen. Gestell är den patologiska och snabba ökningen av attiraljer och koncept som kräver effektivitet på effektivitetens villkor. I denna obarmhärtiga strävan mot effektivitet blir mänsklig subjektivitet överkörd. Mina tre empiriska studier (I-III) sammanstrålar i denna distinktion. Genom att klargöra olikheterna mellan teknologi – som vi alltid haft med oss – och Gestell undviker vi den typiska dualismen att antingen gudomliggöra eller demonisera teknologi i praktiken. Är det möjligt att arbeta med teknologi utan att bli förförd och utmanövrerad av denna underliggande attityd? Hur balanseras vårdandets tveeggade mission: att trycka på rätt knappar och vårda empatiskt?

Tekniken ska vara en katalysator - bidra i processer och se till att saker sker, men sedan dra sig tillbaka obemärkt. Någonstans på vägen har vi förletts tro att tekniken kan lösa alla våra problem, och att en maskin är bättre än vårt närmaste 'instrument' - jag själv, min förmåga att beröra, att samtala och att trösta. Utmaningen för vårdgivare i tekniktäta miljöer är att veta när den objektiva och mätbara dimensionen ska framträda och när den ska få stå tillbaks till förmån för patientens levda erfarenhet. Att återknyta bandet mellan vårdandets teknik och vårdandets konst vore det kreativa draget i vårdande termer. Utmaningen är att stanna upp och reflektera över det vi gör. Att ha modet att stanna kvar i stället för att gå i stå av ambivalens och tvetydighet.

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I

Music therapy—a complementary treatment for mechanically ventilated intensive care patients

Sofia Almerud and Kerstin Petersson

The aim of this study was to ascertain whether music therapy had a measurable relaxing effect on patients who were temporarily on a respirator in an intensive care unit (ICU) and after completion of respirator treatment investigate those patients' experiences of the music therapy. In the study both quantitative and qualitative measurements were applied. Twenty patients were included using consecutive selection. It became apparent that the patients remembered very little of their time in ICU. The analysis of the quantitative data showed a significant fall in systolic and diastolic blood pressure during the music therapy session and a corresponding rise after cessation of treatment. All changes were found to be statistically significant. The conclusion was that intensive care nursing staff can beneficially apply music therapy as a non-pharmacological intervention.

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Introduction

Treatment in an intensive care unit involves many and constant medical tests and observations plus a host of procedures. Furthermore, the environment is one of technical apparatus, machinery and frequent medical testing. As a result it can be difficult for the patient to relax. To be seriously ill and confined in strange surroundings can be bewildering and even frightening. This can lead to fatigue and confusion of the patient (Bergbom-Engberg 1989; Fontaine 1994; Granberg Axèll 2001). The many routines and procedures can make the patient feel threatened and lose self control. Intensive care patients are sensitive, vulnerable and overwhelmed with a sense of fright and excitement. The intensive care nurse must therefore plan and implement treatment of the patient with both caution and care (Granberg Axèll 2001).

Environment and experiences

Intensive care units have a continuously high noise level, often over 60 dB. An alarm from commonly used technical apparatus can produce a sound level of up to 90 dB. Unexpected noise is stress producing, creates anxiety and leads to raised heart rate (Fontaine 1994). One of the foremost causes of displeasure is mechanical ventilation, the endotracheal tube and suctioning (Bergbom-Engberg 1989; Fontaine 1994; Butler 1995).

A proportion of intensive care patients suffer from so-called "intensive care syndrome" (ICU syndrome) which is characterised by perceptible disturbance. This can often lead to sight and hearing hallucinations, aggression, confusion and paranoia. The cause of ICU syndrome is unknown but it is likely that several factors contribute. Precipitating factors can be the illness or injury in itself with

patho-physiological disturbance, the medical treatment, the unfamiliar environment or the normal routines and procedures on the unit. Pain-killing drugs and tranquillisers can contribute further to the ability to interpret stimuli (Bergbom-Engberg 1989; Granberg Axèll 2001). Between 20 and 60% of all intensive care patients develop some form of delusion (Granberg Axèll 2001).

To alleviate anguish and anxiety in respirator-treated patients sedatives are usually administered. Medication has a number of recognised adverse effects such as nausea, vomiting, muscle weakness and atrophy, need for extended time on the respirator, increased susceptibility to infection, changes in the mental state and even death (Chlan 1998; Ledingham et al. 1988). Undesired side effects of tranquillisers have prompted researchers to take interest in alternatives to pharmaceutical preparations (Fontaine 1994).

Music therapy

Biley (1992) defined music therapy as a controlled form of listening to music and it's influence on the person, physiologically, psychologically and emotionally, during treatment of illness or injury. Chlan and Tracy (1999) describe music therapy as a reliable and efficacious treatment for certain critically ill patients, partly due to its capacity to reduce anguish and anxiety without the use of medication. Amir (1999) describes music therapy as a means of producing an intrinsic change in the way the patient experiences the situation. Music can also promote and encourage rest and sleep by way of creating a peaceful atmosphere. Furthermore, the use of headphones shuts out undesired background noise, which is common in intensive care units (Chlan 2000). Music provides a way of filtering out unpleasant and unfamiliar sounds which are part of the hospital environment, and in that way can reduce the need for sedative drugs, thus leading to a speedier recovery (Bonny 1978).

Physiological and psychological effects of music therapy

Music influences the brain by prompting the secretion of endorphins, the body's own

morphine (Fontaine 1994). Music therapy leads to slower heart rate, calmer and more regular respiratory rate and lower blood pressure (Bonny 1978; Chlan 1998; Updike 1990) and has even been shown to result in lower adrenaline levels and reduced neuromuscular activity (Chlan 1998).

Compared to a short rest, music therapy was shown to be more effective in relieving stressful situations which respirator patients experience (Chlan 1998). Music should not be played continuously as it can lead to irritation rather than a state of wellbeing (O'Sullivan 1991). According to literature, 25–90 minutes music therapy seemed to be an adequate treatment period (Guzzetta 1989; Henry 1995).

There are a limited number of published studies on this topic. The music therapy studies carried out in Sweden are on patients other than intensive care patients on respirators. The present study was carried out in order to develop music therapy as an intervention within intensive care.

Objective

The aim of this study was to ascertain whether music therapy had a measurable relaxing effect on patients who were temporarily on a respirator in an intensive care unit (ICU) and after completion of respirator treatment investigate those patients' experiences of the music therapy.

Methods

Design

In the study both quantitative and qualitative methods were applied. By combining both methods the weaknesses of one method can be compensated by the other. Qualitative method describes quality, contents and character (nature). Quantitative method gives cognizance of extent and comparisons of phenomena. Qualitative method is especially of importance in evaluating complex interventions (Polit & Hungler 2001).

Context

The intensive care unit under study is part of a moderately large hospital in southern Sweden.

The total number of respirator hours is in the region of 12,000 annually, which corresponds to 500 days. The usual reasons for patients' requiring respirator help are chronic obstructive lung disease, sepsis, major surgery and trauma. The unit has 16 beds. Staffing levels vary considerably although there are seldom fewer than eight persons per shift. The staff comprises nurses (equivalent to both SRN and SEN), doctors and physiotherapists. The majority of respirator-treated patients are nursed in single rooms with closed doors. Generally the light level is high, as is the noise level, especially during the day. Patients are connected up to extensive technical equipment such as ECG, blood pressure apparatus, tracheal tube, respirator and central venous catheter.

Intervention

Patients in the study group listened to music via headphones, which allowed the patient a moment free from disturbance. Headphones also shut out unfamiliar and unwelcome noise from the unit (Chlan 1995). Another advantage is that no one else can hear the music whilst the patient is using the headphones. This is important in intensive care where several critically ill patients may be in the same open area or with beds close together. If the music is openly broadcast it could be a source of irritation for other patients and staff (Chlan & Tracy 1999). The study group listened to the music whilst the control group rested under similar circumstances but without the headphones with music. The control group was only used in the quantitative part of the study to determine if there were any differences between music therapy and a period of tranquillity under similar circumstances.

Classical music was played for 30 minutes in conjunction with night sleep (Table 1). Each patient listened to music on two separate occasions. A portable cassette tape recorder with headphones was used. All patients wore headphones during the entire measurement period. The ambition was that the patient, during intervention, be free from pain and afforded a comfortable lying position. The lighting was dimmed as far as practically possible. No planned interruptions by nursing

Table 1 Musical compositions used in the study

Composer	Composition
Beethoven	Suite 1 from Sonata in C-sharp minor (Moonlight sonata)
Pachebel	Canon
Debussy	Claire de lune
Bach	Air from suite for orchestra no. 3
Vivaldi	Spring: Largo
Seymer	Solöga [Suneye]
Marcello	Concerto for oboe in D minor: Adagio

or medical staff were made during the intervention period unless the patient's condition demanded it.

Pieces of music from previous studies (Henry 1995; Johnston & Rohaly-Davis 1996; Updike 1990) were chosen for this study.

Patient selection

Adults, intensive care patients who were temporarily in need of mechanical ventilation and whose condition was physically stable was included. Selection was consecutive. Patients were excluded if it was known that they were suffering from a severe psychiatric condition, severe depression or were mentally retarded. Patients with cerebral haemorrhage thought to be at risk of psychological effects were also excluded. The reason for excluding these patients was that their condition could render a follow-up interview more difficult or even impossible. Ten patients were included in each group (Table 2).

Each patient received sedatives during respirator treatment. In accordance with ICU routine, sedatives were discontinued a set time before extubation. However, two patients in each group were receiving a continuous supply of analgesics. At the time of music therapy the patients' conditions were anything from totally awake and alert, to drowsy but receptive after stimulation.

Procedures

The quantitative part of the study was concerned with measurement of pulse, systolic and diastolic blood pressure, respiratory rate, and oxygen saturation, SpO_2 (Chlan 1998;

Table 2 Demographic data

		Study group (*n* = 10)	Control group (*n* = 10)
Men/women		5/5	3/7
Age (years) mean/median		68.7/67	64.2/73
Range		54–81	27–81
Time on mechanical ventilation (days)			
Mean/median		13.95/11	9.1/9.5
Range		1–31	2–19
Diagnoses	Infection	3	2
	Respiratory distress	3	4
	Trauma	1	2
	Postoperative care	3	2

Updike 1990). In accordance with a special protocol, the various values were recorded at 5-minute intervals during the period of intervention. The qualitative part of the study consisted of interview questions concerning recollections and experiences of respirator treatment and music therapy. The interviews were conducted by one of the leading author 2–4 days after the patient was returned to the ward.

Six of the 10 patients in the study group were interviewed. Two patients died just after returning to the ward, one declined to be interviewed and one patient was unable to communicate for several days after returning to the ward.

The interview situation was relaxed. All patients were interviewed in the single rooms where they were nursed. The patients were encouraged to speak freely in answer to the questions they were asked. In the case of the patient not recollecting, further, more in-going questions were asked. The time taken for interviews was between 20–30 minutes.

The leading author is a trained and experienced worker in this area. At interview, the leading author endeavoured to counterbalance this by not posing leading questions but by allowing the patients to freely recount their experiences.

The questions posed at interview were;

Do you remember your time on the respirator? How would you describe your experience?

Do you remember that you listened to music? How would you describe your experience?

Analysis of the data

Quantitative data was analysed using repeated measurements and paired samples. Repeated measurement analysis of variance was used to determine if there were any differences between or within the groups over time. Paired *t*-tests were used to examine differences between two points of measurement (Altman 1992).

For data analysis, the computer programme SPSS-PC 11.0 for Windows was used. The diagrams were created in Microsoft Excel.

Patients in the study group listened to music on two different occasions and objective parameters were noted at both times. Mean values were then determined from the collected data. In the control group one measurement per patient was made.

Qualitative data, i.e. the interview material, was analysed by content analysis, partially according to Burnard (1991). The interviews in this study were recorded on cassette tape except in one instance when the patient expressed a wish not to be recorded. Instead, written notes were made. Transcription was carried out in every case by the leading author herself and immediately on completion of the interview. Firstly, short notes were made on what was discussed, and then the interview was written out in full. The transcriptions were then read through so that the leading author could acquaint herself with the contents. The text content was then coded, headings created and the data characterised. In stage 4 the numbers of categories were reduced; those similar in content being

combined. Headings or categories were further reduced in order to create a final list. Both authors read through the entire material and produced their own categories; those two lists were then compared with each other and requisite changes made. The transcripts were then read through yet again with the final list of categories in order to check that they represented the content of the interviews. The text content was divided and placed under appropriate headings keeping together those parts of the interviews which belonged together, and retaining the context. The following categories were created; recollection, anxiety and discomfort, illusory feelings and close relationship. This final list of categories was established after repeated discussions and comparisons of the authors' individual lists. Examples of each of these categories, using direct citations are given in the result section. The citations are numbered to show that each patient is quoted (Burnard 1991).

Ethical aspects

Data was collected before, during and after treatment and was normally registered via the monitoring equipment. The patient was therefore undisturbed by registrations being made more frequently.

Informed consent, both verbal and written, was obtained prior to the interviews.

Data from the control group was used only to compare the quantitative material with the study group and is not a part of the procedure. No personal data was registered in the control group.

Consent for the study was obtained from the Regional Committee for Medical Research Ethics at Lund University. Diary number LU 547-00.

Results

Repeated measurements showed no significant differences between the two groups, nor were there any differences over time. Paired *t*-tests, however, showed significant mean differences between two points of measurement on systolic, diastolic and heart rate in the study group. No significant differences were found in the control group.

In the study group, both systolic and diastolic blood pressure fell during music therapy only to rise again after completion of treatment ($P = 0.005$). The differences were statistically significant ($P < 0.005$). The mean systolic blood pressure fell from 136 to 124 mmHg during treatment. Sixty minutes after the completion of treatment, systolic blood pressure had risen from 124 to 131 mmHg ($P < 0.017$) (Figs. 1 and 2).

Heart rate fell, during music therapy but this was not significant ($P = 0.065$). The increased pulse rate that occurred after completion of the session was statistically significant ($P < 0.002$) (Fig. 3). These changes did not occur in the control group.

No statistically significant results were found for respiratory rate and SpO_2 for either group.

During interviews, in the category *recollection*, it was shown that the patients remembered little of their time on the respirator. One patient (no. 6) who was ventilated overnight postoperatively had "*no recollection at all*." Another patient (no. 1) who was ventilated for 10 days due to respiratory obstruction said that her recollections merged together, were vague and were "*in zigzag*." This patient wondered why she couldn't remember and wished that she could remember more. One woman (no. 2) who was on a respirator for 48 hours postoperatively said "*I don't remember being on a respirator, it's totally erased*." Her first recollections were after being returned to the ward. One woman (no. 4) who was mechanically ventilated for 21 days due to trauma said: "*I remember the ICU, well, I think I do . . . but it's a bit blurred . . . .*" One man (no. 3) with an infection, and was nursed for 10 days on the respirator, related that: "*everything is so blurred, I think I remember sometimes, a few things/ . . . /it's not gaps, I just can't remember*." He wondered, towards the end of the interview, whether it was usual that other patients remembered more than he did. None of the patients recalled that they had listened to music.

In the category *anxiety and discomfort*, two patients recounted their feelings of anxiety and discomfort in connection with respirator treatment. "*It was unpleasant when they took away the phlegm in my throat. I had a sort of panic attack and couldn't get any air, I remember that*."
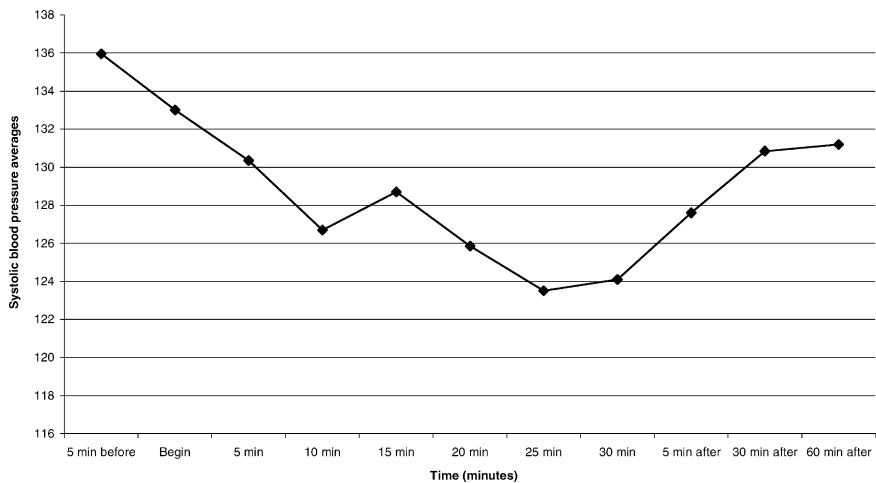
Fig. 1 Mean systolic blood pressure over time.

It was apparent also that constant light and noise was a source of discomfort.

After 48 hours nursing on a respirator, in the category *illusory feelings*, one woman (no. 2) said: "... *I make such a mess of things. I said lots of stupid things*." She recalled her illusory experiences saying: "*I accused them of theft/... /my door, I couldn't open it/... /I'm totally mixed up*." From the interviews it was apparent that there were also difficulties in distinguishing night and day.

In the category *close relationship*, one patient (no. 5), after one month on a respirator, considered that there was a great sense of

Fig. 2 Mean diastoilc blood pressure over time.

Fig. 3 Mean heart rate over time.

security when he had his family around him. He said that: "*it felt good when my family came . . . .*" This patient felt secure also with the members of staff who nursed him.

Discussion

This study demonstrated significant changes in systolic blood pressure in the study group. Both systolic and diastolic blood pressure fell during music therapy sessions only to rise again on completion, as is shown in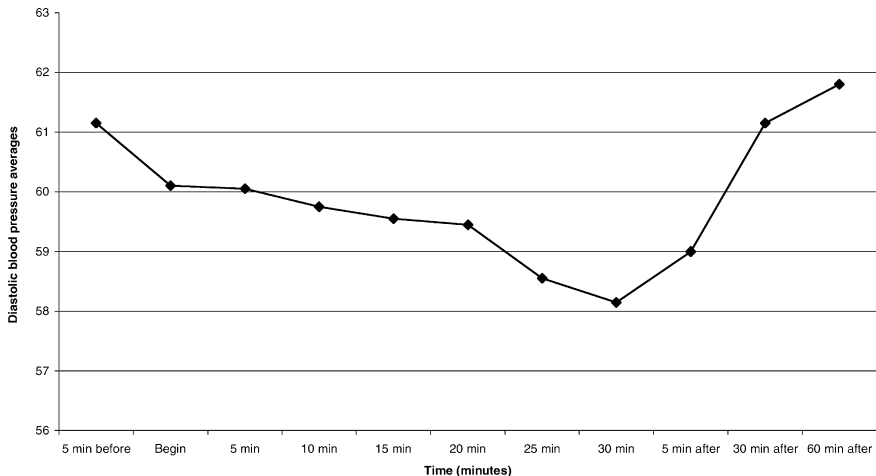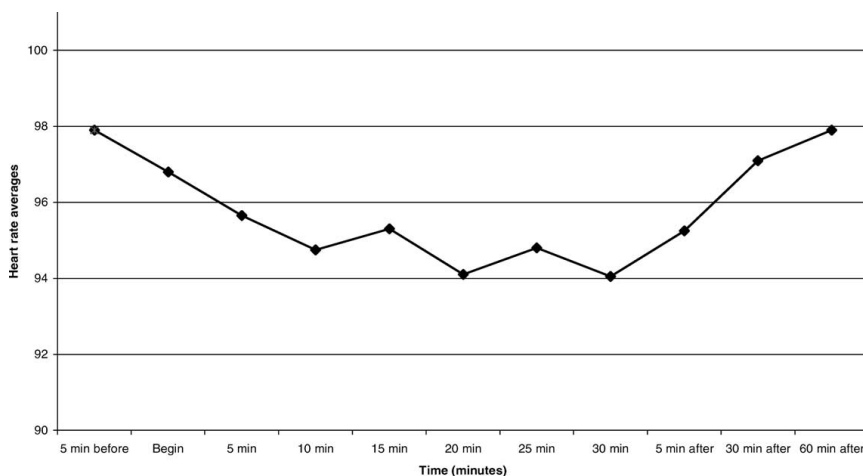 paired samples *t*-test. That no significant differences were shown in repeated measurements between the two groups could be due to the limited population. The qualitative part of the study showed that the patients remembered little of their time on the respirator.

It can be beneficial to allow the patient, as far as possible, to choose the music category. Bonny (1986) is of the opinion that critically ill patients tend to prefer, and respond better to classical music. In this study, patients were semiconscious and could not actively choose for themselves. The choice of music in the study has adhered to that described in the literature: full of character, slow, repetitive rhythm, predictable dynamics, low tonic register, pleasant harmony with no vocal content.

Although music therapy is considered to be free from side effects, the intervention must be used with caution. A patient can have an intense, emotional response to a specific piece of music. Nurses must therefore be on the alert for this (Chlan 2000). In future studies one should consider using newly composed music in order to avoid emotionally strong responses.

The interviews revealed that the patients had no recollections of the music therapy. However, clinical effect could be shown by the quantitative data collected. It is conceivable that the relaxing effect of music contributed to the lack of recall in those patients. A second interview ought to have been carried out after discharge from hospital in order to make known experiences which the patients did not recall in the first interview in hospital. In the surrounds of their own home, patients can recount their experiences in a more relaxed way. The interview duration was rather short (20–30 minutes) due to the patients showing signs of fatigue, sometimes in the form of delay in answering or at other times actually falling asleep. The leading author waited for the patient to add more information and if not, the interview was terminated. Had the patient been given more time it is possible that more information had been elicited. Letting the patients listen to music during the interview

may have been another means of prompting memory recall. It may even have been of interest to enquire as to the patients' music interests; if they listened to music, how often and of which sort. It is possible that the patient is more inclined to remember music therapy if he or she is a habitual listener to music.

A validation problem with qualitative methods may be the researcher's inability to set aside his own preconceived ideas and produce objective and accurate reports (Polit & Hungler 2001). In order to insure validity and reliability in this material the co-author scrutinised the interview transcripts and categorised them independently before comparing them to the leading author's findings, and reaching a consensus (Burnard 1991). From the separate sentence sub-units the authors constantly referred back to the interview transcripts to get an overall picture. The number of patients was small; a greater number would be required to guarantee the categorisation.

The findings were similar to those of White (1992) who showed, in a group of patients in ICU, a reduction of heart rate and blood pressure when they listened to relaxing classical music. Patients who have been interviewed after respirator treatment have stated that listening to music helped them to relax and improved their emotional status, irrespective of whether significant differences in physiological values were demonstrated or not (Guzzetta 1989; Chlan 1998).

In the present study it was apparent that the patients remembered little of their time in intensive care. Butler (1995) suggested that most patients in intensive care have recollections of their time on the respirator but they are in general vague. Butler attributed this lack of recall to the medication administered. After the patients have regained consciousness and no longer require intensive care it is important to appreciate that they may have difficulty in remembering. The patients may even be ashamed of not being able to recall accurately and choose therefore to say that they do not remember at all. Memory images can be of "jigsaw puzzle memory" which is a common occurrence (Granberg Axèll 2001). An explanation of memory failure may be that certain patients, at interview could only recall fragments of their

experiences, could not find the right words, or simply were too tired to recount their experiences. The ability to remember can, according to studies, be related to sedation routines or other treatment. Memory can return much later when the patient feels relaxed and secure (Granberg Axèll 2001).

The interviews in this study were carried out only 2–4 days after discharge from ICU. This may not be sufficient time for the patients to consider what they have experienced and they may not be prepared to be confronted with their memories, thoughts and reflections on their situation, past and present. This could explain the patients' limited recall. Furthermore, the patients' debilitated condition may have influenced their powers of recollection. Granberg Axèll (2001) suggests that interviews be conducted ideally 6–10 days after discharge from ICU. By this time, patients are no longer considered affected by analgesics, sedatives or other medication administered in intensive care.

One patient in this study said that her door would not open. Whether this is correct is of course difficult to know, but since she was bed-ridden it is not likely she could have got up to try to open the door. She said she had been "totally mixed up" probably meaning that her thoughts were jumbled and that the images she experienced had been unreal. Delusion is a phenomenon described by Granberg Axèll (2001). The patients have difficulty in grasping time and the difference between night and day. It is also difficult for them to feel the passing of time. Time "vanishes." There may be a connection between lost or deranged perception of time and the interruption of the sleep pattern i.e. the rhythm of normal sleep and wakefulness. The technical equipment can further contribute to anxiety. To be unable to sleep creates vulnerability, fatigue and exhaustion leading to an increased inability to relax and go to sleep; a heightening of inner tension and the negative spiral.

One factor which can reduce anxiety feelings and fear, is close relationship. In this study one patient describes the security of having his family nearby. The patient's family and friends are considered important in reducing fear and controlling emotions, raising hopes and providing an assurance against anxiety and

confusion (Granberg Axèll 2001). The patient in this study, in describing togetherness with his family also said that he felt secure with the nursing staff who looked after him.

Clinical implications

Patients in the study group wore headphones during the entire measurement period i.e. before, during and after the session. Both blood pressure and heart rate rose significantly after completion of music therapy even with the headphones still in place. From these results it seems reasonable to draw the conclusion that music therapy may have a better relaxing effect than the use of headphones without music. The result motivates a larger study with more patients included.

Had more patients been included, the prognostic value of the results would have increased. It would be interesting to see if music therapy can be an effective complement to pharmacological treatment. In the future, perhaps the dosage of sedatives and thereby their negative effects, could be reduced and combined with a non-pharmacological intervention such as music therapy.

Further research in the subject should include increased quantitative measurements to lend a greater degree of certainty and credibility to the findings. A more comprehensive study is recommended with the inclusion of a greater number of parameters e.g. cortisol and immunoglobulin values. McKinney (1997) found that music stimulated the immune system. This was demonstrated by measuring immunoglobulin A in saliva. A lowering of beta-endorphin levels has also been found in conjunction with music therapy. Myskja and Lindbaek (2000) is of the opinion that music can influence the balance of hormones such as a reduction of ACTH and other stress hormones. Miluk-Kolasa et al. (1994) found that listening to music produced a marked reduction in saliva cortisol in patients subjected to preoperative stress.

The noise level in intensive care units could be an interesting research subject for the future; likewise a study of the effect which a change in the interior environment could have on the patient. It would also be of interest to carry out a similar study on ICU staff who work in this stressful environment.

Clinical care studies support the use of music to alleviate anxiety and fear (Chlan 1998; Guzzetta 1989; Updike 1990). Music therapy is an intervention that constitutes a part of the holistic approach to nursing the critically ill patient. Relaxing music, carefully chosen, should be offered to all patients undergoing mechanical ventilation in the intensive care unit. Music therapy can produce positive effects in this patient group, for example by promoting relaxation and reducing anxiety by non-pharmacological means. This conclusion is supported by Chlan (1995).

Music therapy is a simple, inexpensive and reliable tool which can be applied with advantage in the nursing of intensive care patients without risking unwanted side-effects.

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II

Of vigilance and invisibility – being a patient in technologically intense environments

Sofia Almerud, Richard J Alapack, Bengt Fridlund and Margaretha Ekebergh

ABSTRACT

Equipment and procedures developed during the past several decades have made the modern intensive care unit (ICU) the hospital's most technologically advanced environment. In terms of patient care, are these advances unmitigated gains? This study aimed to develop a knowledge base of what it means to be critically ill or injured and cared for in technologically intense environments. A lifeworld perspective guided the investigation. Nine unstructured interviews with intensive care patients comprise its data. The qualitative picture uncovered by a phenomenological analysis shows that contradiction and ambivalence characterized the entire care episode. The threat of death overshadows everything and perforates the patient's existence. Four inter-related constituents further elucidated the patients' experiences: the confrontation with death, the encounter with forced dependency, an incomprehensible environment and the ambiguity of being an object of clinical vigilance but invisible at the personal level. Neglect of these issues lead to alienating 'moments' that compromised care. Fixed at the end of a one-eyed clinical gaze, patients described feeling marginalized, subjected to rituals of power, a stranger cared for by a stranger. The roar of technology silences the shifting needs of ill people, muffles the whispers of death and compromises the competence of the caregivers. This study challenges today's caregiving system to develop double vision that would balance clinical competence with a holistic, integrated and comprehensive approach to care. Under such vision, subjectivity and objectivity would be equally honoured, and the broken bonds re-forged between *techne*, 'the act of nursing', and *poesis*, 'the art of nursing'.

Key words: Caring relationship • Critical illness • Intensive care • Nursing • Phenomenology • Technology

BACKGROUND

Efficient treatment is the goal of the hospital. Everything from fittings to architecture serves this pragmatic purpose. Critically ill patients admitted to the intensive care unit (ICU) most poignantly encounter this overarching concern with efficiency. First and foremost, intensive care practice concerns the restoration and maintenance of disordered physiology (Lindahl, 2005).

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Nothing in the hospital or ICU, however, caters to the human reality that the institution should 'host' its visitors. 'Hospes', in its Greek root, means stranger-guest-friend. The word signifies that the hospital milieu should welcome those who must spend time there. It is a question of balance.

Heidegger's rich word for the essence of technology, *Ge-stell*, carries the senses of being 'framed', 'set up' or 'duped'. It connotes sterility, mendacity, concealed matters or obscurity. Under the domination of *Ge-stell*, all beings whatsoever are disclosed as 'stock' or 'resource': objective, calculable, quantifiable, profitable or disposable. Profit and efficiency for efficiency's sake sabotage what by vocation we should shelter and safeguard (Heidegger, 1954/1993).

Decades of tremendous progress in medical technology continues unabated. Sophisticated tools for coping with critically and seriously ill conditions, such as monitoring devices, an array of signal processors and reliable assessment displays, make the ICU the most technologically advanced environment in a hospital. Nurses and physicians alike receive specialized,

advanced technical training so that they might monitor the patient's condition and immediately make optimally informed clinical decisions. Likewise, they must monitor the impact of the latest developed drugs upon vital functions (Gjengedal, 1994; Wikström, 2003; Lindahl, 2005). This impressive array of complex equipment that surrounds the seriously ill patients, their relatives and staff members allows Western medicine to take unprecedented care of the physiological damage to the human organism. Is this an unalloyed gain?

Medicine as a modern and post-modern profession hooks its star to the double-coached wagon of natural sciences-technology as the 18th century wanes (Foucault, 1989). At length, it transmutes into a positive, empirical, objectified and mathematically precise discipline with its own mode of clinical seeing. Having made this commitment, medicine would ever after not only partake in the glorious success of 19th century science but also stand accused of harbouring the blight of this historical 'moment', nihilism (Nietzsche, 1982). In our millennium, we inherit a legacy of divisive value judgements. How do we juggle the seemingly impossible dualism: commitment to medical technology versus commitment to individualized personal care?

By its very nature, the intensive care environment is stressful. Not surprisingly, research has focused on factors that create or contribute to the ICU patient's stress. The most frequently investigated variables include noise, lack of sleep, enforced immobility, social isolation and communication problems (Granberg Axèll, 2001; Alasad and Ahmad, 2005). Minimal attention has been paid to elucidating the patients' experiences of having one's world capsize. Almerud and Petersson (2003) uncovered some meanings: the frustration of being unable to speak and pain, confusion, fear and anxiety connected with the actual illness. This study aimed to develop a knowledge base of what it means to be critically ill or injured and cared for in technologically intense environments.

METHODS
Clinical setting
The ICU where the study was conducted is part of a moderately large hospital in southern Sweden that cares for patients of different ages with various diagnoses. The total number of beds in the hospital is 300, of which 11 beds are allocated to the ICU.

Sample and ethical considerations
The charge-nurse informed the researcher of possible participants. Prior to the first interview visit, she obtained informed verbal consent. Before the interviews began, the chief clinicians granted written permission to perform the study, and the participant-patients signed written consent.

Criteria for inclusion in the study were as follows: adult patients in intensive care with a life-threatening condition or manifesting insufficiency of vital organ functions. Concretely, two female and seven male patients participated. The age range was 45–74 years old with a median of 59 years. The participants' admission in the ICU with either a critical illness or injury was between 1 and 7 weeks. All clearly remembered their stay in the unit and willingly shared their lived experience of their stay there.

This study, conducted in 2005, conformed to the principles outlined in the Declaration of Helsinki (World Medical Association Declaration of Helsinki, 2005). In Sweden, there is no need for a written consent from an ethical board if written consent has been obtained from the participants and if the study does not involve a physical intervention affecting a person (Statute from the Swedish National Board of Health and Welfare, SFS 2003:460).

Data collection
Unstructured, open-ended interviews served to elicit in-depth information about the patients' lived experiences of being critically ill or injured and their perception of their treatment in a technologically intense environment. Two interviews took place in the homes a few days after discharge. The others occurred in the patient's room in the hospital, when the patients no longer were in need of intensive care. The first author conducted, audiotaped and transcribed verbatim all interviews which lasted between 52 and 87 min.

Data analysis
Data analysis followed the phenomenological approach as described by Giorgi (1997) and Dahlberg *et al.* (2001). Such analysis is a fluidly flexible movement between whole-parts-whole. Importantly, each part is understood in terms of the whole, which in turn is understood in the terms of the parts. Sensitivity to this subtle and pervasive relationship uncovers the inherent ambiguities of the phenomena. Phenomenology intends to understand this rich lifeworld data on its own terms. The analysis systematically and rigorously transforms concrete descriptions into concepts. The main goal is to explicate the essence or general structure of the phenomenon (Giorgi, 1997; Dahlberg *et al.*, 2001). From the start of the process until the final analysis, the researcher 'bridles' her pre-understanding of the material under consideration in order to encounter it in an open manner and make unprejudiced generalizations about it (Dahlberg *et al.*, 2001).

Analysing process

Several readings of the transcribed interviews preceded the actual analysis. Analysis first divided the text into smaller parts called meaning units. Next, statements pertaining to critical illness and care were identified and grouped together. In distinguishing the cluster of meaning units, the researchers used the everyday language of the participants. Such concrete data avoid the influence of theoretical explanations. Engaged in a dual process of leading and being led by the data, the researchers juggled as adroitly as possible openness and pliability with critical distance. Then, the researchers transformed the concrete data into abstract scientific statements, organizing the parts into patterns. In result, a general structure emerged which is the phenomenon's essence and its constituents. Essence is what makes a particular phenomenon be that phenomenon, whereas the constituents particularize the phenomenon's totality (Dahlberg *et al.*, 2001). The following results present the essential picture of being under care for a critical condition or life-threatening illness in a highly sophisticated technological milieu. A description of the meaning constituents further elucidates its meaning. The four constituents of this picture are the following: the confrontation with death, forced dependency, an incomprehensible environment and the ambiguity of vigilance and invisibility. Quotes from all the participants exemplify the particulars of the phenomenon and clarify explicated meanings.

FINDINGS

Critical illness/injury threatens life. This threat of death overshadows everything. It perforates the existence of the individual now confined in a frightening incomprehensible environment, one under the sway of machines, one that restricts and constrains and one that fosters passivity and compromises integrity. Control over ones body withers, influence over one's situation disappears and freedom vanishes to determine daily life events. Caretakers take for granted the machines in the ICU, but rarely discuss with the patient their invariant and alienating impact. Suffering persists and terror lingers. Unacknowledged and uncorroborated experiences trigger existential loneliness and dread. Patients admitted to the ICU have been socialized to believe in the expertise, competence and authority of the medical personnel. Once admitted and medically compromised, they adapt and adjust to the environment and eventually to its routine. At the start of treatment, patients do not question but typically trust the health care system and put their lives into the hands of the caregivers. On the one hand, this giving oneself over and trying to be a good patient promotes the sense of safety. On the other hand, it renders one extremely vulnerable. It soon becomes disturbingly evident that the 'good hands' into which one has put their life turn out to be mostly an extended arm of technology. Why so? Addressing the cardinal issue of the vital organs and their functions mostly preoccupies caregivers. The impact upon patients is dreadful. They apprehend themselves as objects of observation, scrutinized and monitored, subjected to rituals of power. Although competent supervision stabilizes the biological body, nevertheless, the patient feels marginalized; a stranger cared for by a stranger. The roaring shout of technology silences the sick person's timid utterances about their real and shifting needs, medical and psychological-existential. Muted patient voices deafen caregivers' ears.

The confrontation with death

Every severe illness or injury threatens life. One patient describes that the most significant fact of being an ICU patient is to be close to death without realizing it. Most patients, however, wonder almost immediately if they will recover enough to return home again. Questions assault them. They brood: Why did the severe illness or injury happen to them? What did they do or not do to bring it on? Endless questions.… In what is pre-eminently sane, they begin preparing for the fact that life may be ending. How do they cope with such a brutal existential matter? In the dire gravity of their situations, death seems about to pay a visit. Making jokes or using metaphors serves to stall the confrontation of the raw implication of the illness or injury: '*About those lines, which one am I supposed to look at if I'm dead, I said? Well, it's the top one …. If that line is flat, you're dead. Ok, that's good to know, I said.*' It is vitally important to discuss such concerns. Most caregivers take time to talk to the patients, but focus mostly upon everyday things. Patients find that staff shy away from levels of deep fears, heart-rending needs or innermost thoughts. In the technological milieu, the deeply subjective issues about illness lack a place. It is not that caretakers deliberately ice-out existential dimensions. Technological routines are by nature shallow. Insofar as they control most of the caregiver's time and attention, she overlooks the patient as a unique person and fails to notice idiosyncratic worries. Nevertheless, patients experience the superficiality and studied professionalism of the caregivers as a preference to stand aloof and distant. A too cheerful attitude towards the patient also betokens a hollow facade. In the face of a polite smile and professional tone of voice, it is hard for the patient to open up and utter basic fears and concerns. Nothing in the ICU situation ameliorates strangeness

or invites talk about death and its vicissitudes. To patients, it seems that caregivers really do not want to know: '… *no one dares to ask: how are you really feeling?'* Striving to reclaim their life, they request sessions with a deaconess or a welfare officer, anticipating the possibility of opening up about their suffering. Sadly, meeting these persons fails to reduce the rock-bottom loneliness.

In spite of unnerving insecurity, a will to survive persists. In the acute phase of treatment, the critically ill person does not fight to retain or regain limited autonomy. The fall into serious or life-threatening illness cuts holes into the individual's existential pattern. Weakened, lacking control and flat on their backs, patients find it difficult to fight for their own sake. In moments, willingly they would let go of life. However, no man is an island. Being attuned to loved ones constitutes a true lifeline. Patients perceive that nearest family and dearest next of kin want them to hang on, to fight and not give up. Cherishing loved ones quicken the patient's spirit, fill up the existential gap and cogenerate the desire to survive. These 'others' provide therapeutic support. For their sakes, the patient fights the battle for survival.

Whatever happens, as a result of this confinement nothing will ever be the same. The 'moment' it turns is easy to pinpoint. Recovery or recuperation starts when the patient asks: '*Can I manage on my own? Get out of bed in the morning, take my wheel chair and get going?'* One begins again to have a future. Not in the objective sense that tomorrow will come, but the experience of a future approaching like a storm, one the patient can appropriate, live into and wonder about: '*Will I be able to go back to work somehow? And be a human being again, in the machinery.'* The battle for survival takes a new turn too. The patient seeks new strategies and new ways to embody her creativity. In spite of it all, they have the courage to look to meet the life that awaits them. By a positive attitude, the patients hope life will bring and create new dreams: '*I have such goals …. I've decided, in October, no matter what, I will go hunting*.'

An incomprehensible environment

Critically ill patients describe the technologically intense environment as unknown, incomprehensible and sometimes frightening. They hardly attend to the 'geography' of the milieu itself and cannot describe it in any detail. The room simply seems as sterile and bare as a cold garage. Literally and figuratively, the ambience of the whole situation is awkward. Within it, temporarily hostages, they receive insufficient information and few clear answers. They have trouble grasping what happens within them and around them. Ordinarily, everyday consciousness is compromised. Since the caregivers do not acknowledge, much less

clarify, the patients experiences, uncertainty and insecurity abound. Inner chaos reigns. Sleep deprivation dominates the nights. Certain typical happenings coalesce to sabotage relaxation or the surrender to sleep including random frightening sounds, the intermittent switching on-and-off of lights and the caregivers' shadowy movements in the room. Sharing a room with another patient complicates matters as well. At the same time ICU patients struggle with their own problems and worries, the dire predicament of their co-patient intrudes into their life space. Unwittingly, they find themselves taking part in their roommate's fate.

Unreflectively, the patients adapt to the presumed or imagined expectations of the system. They do not want to be a bother, they do not wish to disturb the staff but they strive to please. Gradually, they learn the routines such as the staff's most busy time of the day: '… *in the morning and at night I know there is a hell of a lot to do out there, so at those times you feel a little, ah, shucks … do I really have to call on them right now.'* Socialized to believe that coping partly depends upon compliance with rules and conformity to routines, patients seek acceptance by catering to the caregivers' explicit and implicit messages of what it means to be a 'good' patient. One patient also expresses the belief that he gets better care and more attention if the caregivers 'like' him. A price tag comes with trying to adapt and to please. One never comprehends all the things one must do and endure. The caregivers set the tone and give directions. Patients are not allowed to participate in, suggest options or decide about treatment measures. Merely wanting to fit in, to acclimatize to the system and not make waves demeans and infantilizes patients over time. It diminishes one's humanness. Patients feel like biological units, like an exemplar of some diagnosis.

Technology, rather than the caregiver, sets the tone. In spite of fuzziness about the machine and its function, patients acquiesce to devices and procedures. They trust technology because their caregivers do. One patient says about a treatment: '*I haven't fully comprehended what it is for, but apparently it is something good … but seriously, I don't know what it's for …*.' Especially in the acute phase of the illness, exhibiting curiosity about the gadgetry is almost non-existent. Patients take for granted the effectiveness of technology. When the alarms go off, they take it in stride or blame themselves for triggering it. Some patients fear to move in their beds, lest they set off some gizmo. Without clear or ample knowledge, the patient obeys important instructions, doing the very human act of anyone in a dependent position: please the one in power. Blind faith alone authorizes compliance. The predicament, however, is inherently duplicitous. Accurately understood, technology is being served, not another human being.

Forced dependence

Formerly they were 'agents' at least minimally in charge of their own existence; now they have become patients dependent upon the ministration of others and subject to the paraphernalia of technology. It is a sufferance: '*You are a "package", you don't have any power of initiative of your own, and you are totally dependent upon others.*' The forced dependency is total. One's objective body, the body that we have, is cable-connected to apparatuses such as a monitoring device. At the basic physiological-anatomical level, the patient has no choice but to give oneself over to machines, regimens and routines: '*You are restrained, you can't move. You can't go to the bathroom … you just lie there in your bed.*' Another patient says, '*You feel trapped. It's about control, others control me.*'

Restrictions also sap control of one's lived body, the body that we are. The patient, as embodied, feel trapped and want to escape: '*You just want to take it all … just rip everything off and leave.*' One loses the possibility of independent action in even the simplest and most intimate matters, tasks done pre-reflectively and by routine like going to the toilet, shaving or snacking. Patienthood exposes our inherent human weakness. The interviews uncover a telling finding. A patient will ponder and worry about how he might manage his hygiene, but yet does not question whether someone would loosen the cables and monitors so that he might leave the bed. Technology rules the hospital milieu. Taken for granted, devices dictate the comportment of the caregivers and determine simple clinical decisions such as whether the patient might leave his bed to go pee in private.

The patient especially feels like a pawn whenever the caregivers refer to other departments, specialists or hospitals: '*No one wants to say that; this is the way it'll be for you, but everything will be sorted out once I get to XX, as if it was some kind of guru.*' The message is ambiguous. The caregivers do not know what to do next; someone else is going to solve their problems. The caregivers hide behind routines and hierarchic structures to avoid having to field patients' questions: '*Well, they say about test results and so on that they don't know this particular disease … and they don't have access to all my case records.*' Vulnerable in the face of such avoidance, the patient stops asking questions. Insofar as the attitude of technology dominates, patients question and even doubt the sincerity of the caregivers' interest. Thus, caregivers unintentionally put a heavy burden upon individuals already compromised by a critical or life-threatening medical problem. Blind trust in technology ultimately does not inspire confidence in safety and eventual healing. '*You are in the hands of the caregivers … so, you have to trust them and feel safe … or else … you*

won't get anywhere ….*' It does not work. Patients cannot sustain hope in machines. Sadly, the distrust comes out as: '*I did not trust the nurses, or the doctors.*'

An ambiguous vigilance and invisibility

Another disturbing ambiguity appears in the data. Despite being constantly monitored and observed, patients report that they do not feel seen. Instead, within the highly technological environment, the patient and the apparatus meld into a unit, one item to be regulated and read. The faith that caring personnel demonstrate in apparatuses is not matched by comparable reflection upon their dominant presence and impact at the human level. Patients, who want to understand the technologies, find that caregivers speak over their heads while defending the machines: '*I should have told the physicians myself that; Hey! Who are you talking about? They are not supposed to talk about me, they should talk with me.*'

Caretakers demonstrate keen vigilance over technological devices, documented data, laboratory results and measured parameters. These, in fact, filter their medical perception. On the other hand, they pay scant attention to patients' stories and experiences. Patients express that they feel invisible as people, reduced to the status of organs, objects or diagnoses: '*They carefully book everything …. I guess that's good for tracking, but I'm a person.*' This twist concerning vigilance and invisibility creates an alienating collision. Instruments confirm treatment status and progress. Patients experience that the caregivers read the monitoring devices carefully and conscientiously but brush them off their hesitant gestures at speaking. Even more alienating, the physician registers objective data and then uses it as the criterion for telling the patient apodictically how he feels. The extended story goes like this: The physician enters the room, reads the objective data, establishes the 'real' state of affairs and then departs. In consultation with other caregivers, he or she decides the next treatment step. About that decision, the perspective of the patient has no influence.

Patients also express the futility of trying to live up to unrealistic even impossible expectations. The patient has given over self to the health care regimen. It is embarrassing not to meet the caregivers' demands. Feelings of failure and shame surface: '*Then the rounds come, in the morning …. "Well, you don't eat enough." But, Christ, I have to have teeth to chew with.*' Another patient describes being upset and disappointment with herself for not complying with a caregiver's request: '*She said to me: "You have to help." Me, who could not do anything, what was I supposed to help with? … It was kind of humiliating when she couldn't realize I couldn't.*' Like most individuals made to feel humiliated, patients try to

cope by pleasing the caregivers and even taking blame for their treatment failures.

ICU patients express still another ambiguity concerning the matter of observation. Medically speaking, monitoring closely the early critical periods is vital. Careful observation does indeed promote a feeling of security. Nevertheless, constant clinical surveillance boomerangs. Its oppressive when seemingly medical needs, examinations, treatment or exercise ride roughshod over human concerns.

DISCUSSION
Of method

To tap into the complex, ambiguous and emotionally intense environment of the ICU, a reductive method was adjudged minimally adequate. Qualitative methodology offers greater potential for discovering how patients experience the act of caring in the technologically dominated milieu. Of all qualitative methods available, the phenomenologically based descriptive-reflective approach was especially developed to gain knowledge about meanings in the lifeworld. The results attest to its fruitfulness.

Of results

At the nub of our study sits the status of the medico-scientific-technological culture. We would contribute nothing if we would fail to negotiate the Scylla and Charybdis, thus succumbing to the temptation either to divinize or demonize the medical-technological cast of mind. However, the seminal and decisive thinking of Foucault's (1989) *'archaeology of medical perception'* and Heidegger's (1954/1993) questioning about '*the essence of technology*' help focus the enquiry.

Our patient-participants lodge complaints against the inextricable dependency of intensive care upon technical gadgetry. Equally, they bemoan the effect of the medical gaze. Contemporary researchers also uncover this dichotomy and pinpoint a consequent narrowing of focus that blurs patients' needs and worries (Gjengedal, 1994; Barnard, 2002; Alasad, 2002; Lindahl, 2005). Technology we have always had with us. Perennially, humankind has struggled to situate machines and technical gadgets within the larger space of existential and spiritual possibilities. Ideally and from basic motivation, professionals ache to heal and seek incessantly practical-material ways and means to realize its goal. Heidegger is clear: '*the essence of technology is by no means anything technological*' (p. 311). Technology is both '*a means to an end*' and '*a human activity*' (p. 312). The two '*belong together*' (p. 312). Heidegger (1954/1993) lists common blocks to lucid thinking about its essence: if we '*affirm or deny*' technology, '*merely represent and pursue*' it, '*put up with,*

or evade it' or – worst of all – '*if we regard it as something neutral*' (pp. 311–312).

The original Greek term for existents, for the things that are, was *physis*. The word denotes 'the process of a rising,' the 'self-blossoming emergence' of being and its power to endure. *Poesis* designated that someone with skill or an art brought forth something from hiddenness, unfolded it. Originally *techne* (technique) signifies the ability to plan and organize freely, creating, building and producing (Heidegger, 1953/1959, p. 16). Terms like 'craft', 'cunning', 'knack' and 'flair' capture this original sense of technique.

Technology and a caring relationship are indispensable values. There is little evidence, in fact, to suggest that the two modes cannot coexist in harmony (Alasad, 2002). What overturns the balance between them? What leads to the ambivalence and contradictions that patients experience and that sensitive researchers observe? This study harmonizes by clarifying that the nuts and bolts of technology are not equivalent with the attitude of technology, *Ge-stell*, which leads to a one-eyed clinical gaze. Our data show that caretakers rarely meet and match the patients' need to talk about their predicaments. Instead, they filter communication through objective data: a diagnosis, a list of symptoms or the readings of instruments. Thus patient-caretaker interactions vibrate off-kilter, indicating participation in illness mostly at the technical-mechanical level. Caretakers flaunt their specialty but seem to hide behind routines and structures. With deep needs and anxieties unaddressed and reduced to a nameless number on a plastic bracelet, the ICU patient feels lost and uncertain how to act or react. Ambivalently, the patient strains harder to adjust to assumed caregiver expectations. In what is a perversion of the mandate at hand, the patient wishes to relieve the caretaker's burden. It is not supposed to be that way. It is counter-therapeutic.

Nyström *et al*. (2003) found that fear of closeness blurs caregivers' perception. Emergency unit workers fail to see the uniqueness of the person. Instead, they resort to the clinical gaze. They fuse patients and apparatus into a unitary clinical picture. Then, they 'carve up' the biological body as an object of observation, supervision, review and control. Like so many letters of the alphabet, they isolate observations of pulse, temperature, blood count, etc. (Foucault, 1989). Nurses are trained and socialized to spot technical details using this powerful clinical glance (Nyström *et al*., 2003). However, it is as silent as a pointing finger (Foucault, 1989). If used too exclusively, one-sided viewing renders patients invisible. By itself, objectifying observation retards healing. Even the positive effect of medicine is never just a chemical matter. It is relational too, directly related to the doctor-patient

relationship. There is another possibility for clinical education – inculcate cultivating double vision; open another eye that would focus on expressions of the patient's uniqueness and wholeness (Alapack, 1996).

Employing a double gaze is consonant with the nursing profession's self-understanding. Nursing claims ownership of the technological environment and takes responsibility for building the bridge to humane care (Barnard and Sandelowski, 2001). Gladly, it would reduce the ambiguity that hovers in the high-tech milieu. Brain-related practical skills, meshed with the skill to care from the heart, would form a unifying hyphen not a splintering slash. Heart-head working together promotes optimal medical judgement (Alapack, 2005). Thus, it behoves nurses to resist being controlled by the very apparatus they monitor or reduced to functioning as the extended arm of technology. The instruments and tools they handle should be extensions of their own hands and arms. Machines, of course, fulfil organizational demands for safety, routine, control and efficiency. At a deeper level,

however, this wonderfully precise reading of machine data compromises care. Other nursing activities, such as 'just listening' and inspiring trust and confidence, cater to the demands of why the organization is there in the first place.

Conclusion

The roar of technology silences the subtle attempts of the critically ill or injured person to give voice to their needs. It muffles the whispers of death too. And it compromises the competence of the caregiver. Armed with a double skill, however, the nurse can flexibly decide what needs to be carved up, isolated and addressed as a specific problem and what requires assemblage into a human whole. It is a question of balancing state-of-the-art technology with integrative and comprehensive care, of harmonizing the demands of subjectivity with objective signs. In terms of nursing care, the creative act would be to re-forge the broken bond between *techne*, 'the act of nursing', and *poesis*, 'the art of nursing'.

WHAT IS KNOWN ABOUT THIS TOPIC

- An ICU is a technologically advanced environment.
- Intensive care environment is stressful for both patients and caregivers.
- Technology may narrow the caregivers' focus and blur patients' needs and worries.

WHAT THIS PAPER ADDS

- The patients apprehend themselves as objects of observation, subjected to rituals of power.
- In technologically intense environments there is a need to take a holistic approach to care and strike a balance between subjectivity and objectivity and try to re-forge the broken bond between 'the act of nursing' and 'the art of nursing'.
- The loud voice of technology silences the sick person and compromises the competence of the caregiver.

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III

Almerud, S., Alapack, R. J., Fridlund, B. & Ekebergh, M. (2007). Caught in an Artificial Split – A Phenomenological Study of Being a Caregiver in the Technologically Intense Environment. *Intensive and Critical Care Nursing.* (In press).

Summary

A symbiotic relationship exists between technology and caring, however, technologically advanced environments challenge caregivers. The aim of this study is to uncover the meaning of being a caregiver in the technologically intense environment. Ten open-ended interviews with intensive care personnel comprise the data. A phenomenological analysis shows that ambiguity abounds in the setting. The act of responsibly reading and regulating instruments easily melds the patient and the machinery into one clinical picture. The fusion skews the balance between objective distance and interpersonal closeness. The exciting captivating lure of technological gadgets seduces the caregivers and lulls them into a fictive sense of security and safety. It is mind-boggling and heart-rending to juggle 'moments' of slavish mastery and security menaced by insecurity in the act of monitoring a machine while caring for a patient. Whenever the beleaguered caregiver splits technique from human touch, ambiguity decays into ambivalence. Caring and technology become polarized. Everyone loses. Caregiver competence wanes; patients suffer. The intensive care unit should be technologically sophisticated, but also build-in a disclosive space where solace, trust, and reassurance naturally happen. Caring professionals need to balance state-of-the-art technology with integrated and comprehensive care and harmonize the demands of subjectivity with objective signs.

Keywords; caring relationship, critical illness, intensive care, nursing, phenomenology, technology

Introduction

In our modern/postmodern age, there is a symbiotic relationship between technology and caring. The intensive care unit (ICU) mirrors this symbiosis. The mission of nursing is care. But nowadays, nurse training and socialization processes emphasize a 'clinical gaze' insofar as it seizes powerfully upon technical details (Nyström et al, 2003). The status of organs and their function rule caregivers' attitude; in spite of careful vigilance, the patient does not feel seen. A too exclusive one-sided viewing makes patients feel invisible (Almerud et al, 2007). Contrariwise, a double gaze that includes caring is most consonant with the nursing profession's self-understanding (Barnard and Sandelowski, 2001). If we would merely criticize and complain about this dominance of technology over medical-nursing care, we would contribute nothing but a hollow echo. Instead, we should examine the total treatment milieu and the attitude that rules it (Barnard, 2002). Technology is incorporated in the care of the patients and intensive care is to a great extent dependent on its technology. Both technology and caring relationships are of indispensable value. So far there is little evidence to suggest that the two roles cannot coexist in harmony (Alasad, 2002). We both need and want what technology can generate. Equipment is indispensable to medical care. With the best of intentions, nevertheless, things can go awry.

Machines fulfil organisational demands for safety, routine, control and efficiency (Alasad, 2002). To adjudge an outcome on the basis of the efficacy of some technique is adequate but not optimal care. Herein lies the fallacy of thinking that what can not be counted does not count. Meeting and responding to the other is priceless in term of help

even though it clashes with the bureaucratic goal of cost-efficient treatment (Benner et al, 1999; Benner, 2005). The aim of this study is to uncover the meaning of being a caregiver in the technologically intense environment.

Methods

Clinical setting

The ICU where the study was conducted is part of a moderately large hospital in southern Sweden that cares for patients of different ages with various diagnoses. The total number of beds in the hospital was 300, of which 11 beds were allocated to the ICU.

Sample and ethical considerations

The sample was strategic. At our request, the chief clinician and the charge-nurse choose ten participants of different occupations, ages, sex and with various care giving experiences within ICU. The principal author contacted persons on the list either by telephone or by visiting them at work. All nominated informants, six females and four males, agreed to take part in the study and signed written consent. The final sample comprised of four registered nurses, four enrolled nurses and two physicians. Their ages ranged from 29 to 58 years old with a median of 45.5 years. The number of years they had worked in ICU ranged from 1.5 to 27 with a median of 16.5 years.

This study, conducted in 2006, conformed to the principles outlined in the Declaration of Helsinki (World Medical Association Declaration, 2005). In Sweden, there is no need

for a written consent from an ethical board if written consent has been obtained from the informants and if the study does not involve a physical intervention affecting a person (Statute from the Swedish National Board of Health and Welfare, 2003).

Data collection

Unstructured, open-ended interviews elicited in-depth information about the caregivers' lived experiences of giving care to critically ill or injured persons in a technologically intense environment. Given the choice, informants picked as the interview site a small conference room outside the ward. The first author conducted, audio-taped and transcribed verbatim all interviews which lasted between 55 and 76 minutes. The initial question to the caregivers was; "What is it like to work in a technologically intense environment?"

Data analysis

Phenomenological analysis is a dialectical and dialogal movement between whole-parts-whole. They are mutually implicative. Each part is a part-of-the whole; also the whole is constituted by its parts. In realizing the goal of understanding data on their own conditions, sensitivity to the whole-part, parts-of-whole meaning of the phenomenon is crucial. Within that structure rests the inherent ambiguity of all lifeworld phenomena. Phenomenological analysis transforms concrete lived experience into abstract levels where the main goal is an explication of a phenomenon's essence or general structure (Dahlberg et al, 2001; Giorgi, 1997). Here, as well, the researchers have to restrain or "bridle" their pre-understanding in order to encounter data in an open manner (Dahlberg et al, 2001).

Analyzing process

To catch a sense of the whole, the transcribed interviews were read several times. Then, the text was divided into meaning units, natural units of sense, striving to maintain a subtle balance as openness and pliability jostle with distancing, questioning and a critical approach. To uncover discrepancies, the researchers moved repeatedly back and forth between the parts and the whole. Next, the units were organised in order to see patterns, and clusters of meanings. The clusters identify styles of care giving. At this stage in the analysis, the researcher stays as close as possible to the everyday language of the data, keeping the emerging results as concrete as possible. This serves to keep at bay the untoward influence of theoretical explanations. The next step is to reflect upon the descriptive material. Similarities and differences in the data are sought. Patterns start to emerge. The meanings or styles synthesised into a structure. Within the analysing process, a binding thread draws the data from concreteness to a more abstract level of understanding. A contextual essence of the phenomenon manifests itself in relation to the meaning units and clusters as a general structure. It is linked to but not tied down to any particular context or person or situation. This general structure is the phenomenon's essence, cum constituents. The essence is what makes a particular phenomenon, while the constituents are the particulars of the phenomenon's totality (Dahlberg et al, 2001).

In what follows, we present the essence of caring for critically ill or injured patients in a highly sophisticated technological milieu. To elucidate further its meaning, we also present the constituents. Quotes from the participants exemplify the particulars of the phenomenon and clarify explicated meanings (case numbers are given behind the quotes). The three constituents explicated in the next section are: Mastery or servitude

under technology, to be secure in insecurity and insecure in security and to make the human technological and the technology human.

Findings

Work in a technologically intense environment takes head, hands and heart. Technology looms as a conspicuous, imposing and dominant presence. A specific, hierarchic structure emerges. The caregiver sits atop; the patient sits on the bottom rung. From the human perspective, the price tag of this arrangement is expensive. Insofar as technology drives treatment and co-shapes care giving attitudes, it impedes any possible close encounter and sabotages the intention of developing health-inducing interpersonal relations. It also compromises the caregiver's vision and shackles her actions. The very act of responsibly reading and regulating instruments easily fuses the patient and the machinery. The act skews the balance between objective distance and interpersonal closeness. It is as if technology outmanoeuvres caring insofar as the effect of medicine and machinery-management on patient care has become routine. Machines mostly cater to organisational demands for safety, routine, control and efficiency. Sharp technological vigilance, however, renders the patient invisible; dialogue deteriorates into monologue. Technology, with its exciting captive lure and challenging character, seduces the caregivers and lulls them into a fictive sense of security and safety. At the same time, they are vaguely aware that the technological net into which they has been draw and can only exit with difficulty, is frayed. Caregivers implicitly sense the insufficiency of something gone awry.

Mastery or servitude under technology

There is a mandate: master technology. Caregivers comply. They also strive for mastery insofar as technology apparently grants power to control both life and death. Within the hospital's walls, staff monitors dying to know exactly when death occurs: *You keep it in order to know, sort of when the patient passes on. // And if you don't have the monitor then you don't have a clue as exactly when, precisely…*(Informant 8)

Ongoing technological developments alter the particulars of critical care. But, the basic matter of seeking control remains the same. Thus, our subject-participants voice the challenge of gaining expertise about an advanced field of work; *you have to use your logical sense, practice your brain in being alert and very fast take on new things* (Informant 1). To master technology, training is necessary. Since scheduled time for such competence development is not routine, the caregiver is responsible to upgrade skills in spite of a heavy clinical workload. A quick concise evaluation of the patient is required. How to use technology without being blinded by it? How to trust one's intuition and knowledge without technological confirmation? Awareness is keen that technology does not give the complete picture: *The longer you work here, the more aware you get that it is not the whole truth and that there are so many sources of error.* (Informant 9). Not all the different gadgets are viewed as equally trustworthy. Caregivers in ICU esteem X-rays and laboratory reports about blood, urine etc, as more valid and reliable than monitoring devices. In the milieu, nonetheless, technology is routinely taken for granted; calling it into question is rare. The visual data provided by monitoring device provides continuous and exact information: *As soon as they* [the

patients] *get in here, we connect them to our monitors. // That's ICU, to get as much information as possible, at all times* (Informant 4).

Into the ICU, which houses critically ill or injured persons of different ages and with shifting needs, a gale suddenly can blow, challenging the caregivers' competence and caring comportment. At stake is orchestrating the optimal balance between objective distance and interpersonal closeness. Without balance, conversations with the patients go empty, deflecting the real matters of the heart to chitchat about everyday things: *We can give pills and injections and so on, but to just… there might be a lot they need to say.* (Informant 8) *It's everyday talk, not about feelings and so on… you don't sit down just to have a 'deep' conversation, I know I don't* (Informant 5).

The effect of the caregivers' sense of power and control is crucial. Using objective data as a criterion, caregivers tell the patient how they must be feeling. When the physicians enter the patient's room making rounds, they ask the patient pro forma how he or she is feeling. Rapidly, however, the conversation switches into mere information about results of examinations, laboratory results or other objective parameters: *Well, you have the test results already, and you see on the monitors how it is going. So then you know how the patient is* (Informant 3). Caregivers are used to giving information; easily they "forget" to ask the patient; *We say that this looks really good on this monitor and on these parameters. // The patient does not keep beeping until you push the right button, that is, a patient becomes silent when other things get in between* (Informant 8). An uncritical routine of objectifying the patient characterize the caregivers' attitude. Clinical reports are also technical in focus. Technology prevails as "master,"

overshadowing the patient. One caregiver expresses; *It's not the patient who is most important. Some machines are almost, well, more important. // You feel this helplessness because what I'm supposed to be doing is caring for patients not the machines* (Informant 1).

To be secure in insecurity and insecure in security

Another ambiguity that plagues caregivers is that the mastery of equipment gives a sense of control which nonetheless is limited. Insecurity and anxiety lingers. The ground of authentic security is experience blended with theoretical competence. Teamwork is cardinal, too. Insecurity about the machines breeds a sense of incompetence. Collegial support would help. However, according to the caregivers, prestige can impede teamwork. Notice is taken at different levels if one switches a colleague's prescription, for example, or contra-mandates an in-place treatment regimen: *It takes quite a lot to make a decision to do something different than my colleague recently decided to do. You have to pass a border there* (Informant 10). Moreover, the need to show colleagues what you have actually done is great. It is more prestigious to document technological procedures than, for instance, to write that you comforted the patient with talk: *Then the person who comes after me can really see, has she done everything this hour an so on. // That you can show that I really did all my duties* (Informant 2).

Family members are structurally a part of the ICU: *In ICU I talk more with family members than with the patients. They can articulate the things the patient can't or maybe they are not even awake* (Informant 3). The ordinary nurse or physician, both

because of time constraints and lack training in family dynamics, feel insecure dealing with the patients' families. Instead, they solicit the help of other professionals or para-professionals such as a deaconess, priest or a welfare officer. Meeting the next-of-kin is highly emotional and demands interpersonal skills which the ICU caregivers trust these others have developed. Well-trained and educated in caring for critically ill, they themselves put the patient first. Still, the caregivers oft times find it easier to break loose from the dominance of the machines while encountering the next of kin, naturally showing the human touch and creating relationships within which emotional matters come to the surface. Follow-up and follow-through, however, is not part and parcel of the routine. Patients pass through the ward and contact is lost. Caregivers express helplessness and dissatisfaction not knowing what happened to the patient after leaving ICU; *You see a patient briefly, care for him, give a lot of yourself to him, and then you don't know what happened to him* (Informant 4). Time is also an issue. Newly admitted patients call for attention and engagement. A sense of powerlessness permeates insofar as the caregivers rarely receive confirmation of their efforts and almost never get a sense of closure.

To make the human technological and the technology human

Clock time is at a premium. Clock hours are squandered caring for machines; *And if you have even more apparatus, machines, then you have to nick time from somewhere* (Informant 5). Caregivers complain about lack of time and space for existential matters in their daily routine. They express frustration that the treatment milieu is not conducive to undisturbed talk. Quality time, inherently immeasurable, is necessary for listening to patients. But listening in this context is not just being idly attuned, one must listen to

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garner how the patients really feel and what care they want and need. Not measured duration but the sharing of living time develops the deeper truly care giving relationships. In this regard, 'babysitting' technology impedes any possible close encounter and sabotages the intention of developing health-inducing interpersonal relations. It compromises the caregiver's vision. One risks forgetting the patient as a human being by placing too much trust in technology. What is supposed to be a useful tool, again, turns into an impediment to encounter and emotional contact. *It's easy to focus on the monitoring device. And you see that quite often, people forgetting to say hello to the patient* (Informant 9).

A structural 'given' in nursing care is the dialectical relationship between distance-closeness. Caregivers are constantly close to patients in a practical sense: *By washing them, cleaning them, and all that. We are extremely close. // We are there all the time, we are present, we touch. So by us they are definitely being seen* (Informant 4). But this is a non-reciprocal closeness. The touch and nakedness is one-sided, one-way. Similarly, bedside computers increase closeness to the patients in a one-dimensional way. The closeness is data-close, not personal and by no means reciprocal. The nurses are looking at the computer screen, but try to focus on the patient too; *You have to be more aware, you have to think about it yourself and prioritize in order to let the patient have room to talk and to feel a calm, safe, caring environment* (Informant 1). Closeness is from the caregivers' perspective; *You can give so much care to the patient, with the computer. You have access to all results and you can order different things* (Informant 9).

One structure that affords the space and time for creating an optimal caring relationship is the private room. Undisturbed talks happen there more naturally. However, the patients are not given as much chances to talk as they need; *It's very subjective what is the biggest problem for the patient, right now. We should be more open to how the patients perceive their situation. The patient can experience something totally different as the biggest problem* (Informant 7). Something that is especially hard for the inexperienced caregiver is seeing beyond the machine and thus to focus on the patient; *In the beginning you noticed that, kind of, it was only numbers, results and machines all the time. // It's still like that, sometimes, that you have to think twice, I can look at the patient too* (Informant 3). There is a risk, according to the caregivers, that you trust the apparatus and forget the patient; *The patients don't have that priority when everything around them starts to beep. Lots of those errors that occurs, you have to fix immediately and that can't wait, a conversation can be postponed for a while* (Informant 1). We are humans: the need for humanity does not vanish. The distortion of the technological occurs insofar as the machine is made human by predicating human characteristics to it. Technology is given its own "life"; *The Prisma* [dialysis machine] *wants a person to pet it all the time for it to be pleased. // It has to get immediate attention, as soon as it says anything* (Informant 1).

Discussion

Of Method

To assess a situation from outside it, measuring observable behaviour alone is insufficient. We wanted to ascertain the entire situation, the complete predicament of

the ICU wherein everything interpenetrates and influences each other. Thus, we used a phenomenological based qualitative method to gather experiences and meanings, to grasp the total structure and to capture the way a web of relationships co-shapes the greater whole. In the interview situations, the interviewer endeavoured to refrain from leading questions but instead allowed the participants to freely narrate their experiences. During the interview dialogue follow-up questions were posed. For instance "Could you give me an example", "How do you mean?", "Could you explain a bit more?", "How did you feel about that", "Can you describe that in more detail?" etc. The interviews were thus characterized by openness and pliability. The results of this study attest to the fruitfulness of a descriptive method. This study was carried out in one ICU. However, the results have been lifted to a level that makes it possible to apply it on other ICUs. It is possible that these experiences even may be valid to other technologically intense environments than ICU (c f Dahlberg et al, 2001; Giorgi, 1997).

Of results

Ambiguity abounds in the modern/postmodern technologically intense environment. Juggling the 'moments' of being master or slave… of being secure in insecurity and insecure in security... while caring for a patient... and monitoring a machine and trying to making the human technological and humanize technology… are mind-boggling and heart-rending chores.

Ambiguity means that something can be correct from at least two perspectives, and that one might ooze complex emotions connected to each viewpoint. The capacity to tolerate ambiguity requires intelligence and maturity. It is the hallmark of mature adulthood and

seasoned professional competence (Merleau-Ponty, 1964). In the ICU, it is very concrete. The machine need not dominate the 'clinical gaze'. One does not have to interpret a patient according to the readings of the machine. Care and technical are not inherently at odds. Alternatively, nursing personnel might imbue whatever they do with a caring touch that senses, understand and respond to the other's suffering even though one's consciousness is obscure and clouded (Johns, 2005).

Machines have high status with an importance that shows at different levels. A prevalent view is that the technical and mechanical aspects of nursing constitutes 'real work', more important and stimulating than other nursing activities. 'Basic' nursing care is lower in status (c f Alasad, 2002). Those who 'baby-sit' the machines, however, mock that they are so important you need a 'licence' to handle them and a yearly refresher course. The machines themselves tell you they are important by shouting louder than the patient. Patients attest to the importance by becoming mute. Commonly the nurse will fix an intravenous infusion pump or leave a patient to answer a telephone instead of spending time with her/him (c f Sandelowski 2000). When the ventilator malfunctions, the caregiver quickly employs the technique for ventilating by hand, but is much less ready to meet a person in distress with a comforting touch. Of course, the choice of comportment is bitter-sweet. The human imperative - care - has no parallel objective principle. Some nurses even depict themselves as 'monitoring devices'. The situation erodes their sensitivity and ability to interpret. Instead of watching over the patient, they watch over technology (Sandelowski, 1996; 2000). In technologically intense environments, caregivers fuse patients and apparatus into one clinical picture (Almerud et al, 2007). Caregivers so strive to master technology that the patient ends

up an object of observation, supervision, review and control. Thus, the caregiver must face the stark reality: to choose and to act. They must act with ambiguity as a constant companion. As soon as one clarifies the assumptions underlying nursing care, the keen vigilance over technological devices, documented data, laboratory results and measured parameters need not exclude focused and empathic attention to patients' stories and experiences.

We refer back to the issue we already have unfolded: talking about and dealing with core emotions, worries and concerns. The structure of medical treatment in no way grants either space or time for such intimate dialogue. This simple ambiguity concerning inevitable contradictions doubles when the realization that failure to talk aggravates the upsetting emotions and stirs up new ones compounds it. We name this 'ambiguity duplex'. In the face of it, the caregivers feel insecure that if the encounter should become too emotionally close and personal, then the patient might ask questions or discuss matters they are ill-trained to handle. Thus, the 'failed' moment would call into question their professional identity. This ambiguity duplex indexes the increased cognitive complexity and emotional intensity within the psychological economy of the caregiver, who is now juggling a precarious handful of cards. The ready-to-hand explanation is that the intensive care environment is 'tough,' very stressful, and fosters 'burnout'. Such normative views do not confront the ambiguities head on. The stress of the stress generated by a rationalistic approach that will sustain life at any cost, excludes alternative approaches, equivocate about ethical questions and ignore death (Lindblad Fridh, 2003). As an ideal, Benner (2005) describes *disclosive spaces*, social spaces created by human relationship and interaction that make it possible to disclose and

notice. Comforting a patient includes providing social, emotional, physical, and spiritual support. Seemingly soft sounding realities such as comfort, solace, being present and available and touch are per curative, even life-saving to a distressed person. These phenomena are part and parcel of the art of nursing and only become trivialized in a setting focused on highly technical curative techniques. Touch is invisible, almost never charted and never recommended in a nursing care plan (ibid).

In ambiguity, the caregiver is conscious precisely of the 'objects' or the matter at stake. The ambiguity decays into ambivalence whenever the caregivers stop juggling the technical dimension of care with the human side of nursing. They split. They divide technique from human touch. One side they bless, the other they blame. They survive by 'picking sides' and acting consistently with her choice.

Conclusion

Further research about this complex relationship between technology and caring is needed. Both are powerful 'tools' to cure. Machines have high status and technical and mechanical aspects of nursing constitute 'real work', and are often perceived as more important and stimulating than other nursing activities. Caregivers so strive to master technology that the patient ends up an object of observation, supervision, review and control. Reducing the person to an extension of the machine, or a diagnosis tattooed on a plastic band, may create a barrier against potentially emotionally draining relationships. The closeness between patient and caregiver is a non-reciprocal closeness. The touch is one-sided, one-way. The closeness is data-close, not personal and by no means reciprocal. Either the caregivers avert their eyes and pretend that they just do not see, or they see and endure with full consciousness and emotional acceptance what they

see: the full impact of the existential drama, of life and death. The ICU milieu is cognitively and emotionally complex and intense. Ambiguity abounds, which demands reflection from the caregivers. Although caregivers express concern over the impact of technology on their profession, they have embraced - not objects or equipment - but the attitude that sustains technique. A change that would promote balance between the technical and caring dimensions in ICU is needed to promote balance between the technical and caring. The ICU should be technologically sophisticated, state-of-the-art, but also build-in a disclosive space where solace, trust, and reassurance naturally happen. Caring professionals need to balance this state-of-the-art technology with integrated and comprehensive care and harmonize the demands of subjectivity with objective signs.

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IV

Abstract

Modern technology has enabled the use of new forms of information in the care of critically ill patients. In intensive care units (ICUs) technology can simultaneously reduce the lived experience of illness and magnify the objective dimensions of patient care. The aim of this study, based upon two empirical studies, is to find from a philosophical point of view a more comprehensive understanding for the dominance of technology within intensive care. Along with caring for critically ill patients, technology is part of the ICU staff's everyday life. Both technology and caring relationships are of indispensable value. Tools are useful, but technology can never replace the closeness and empathy of the human touch. It is a question of harmonizing the demands of subjectivity with objective signs. The challenge for caregivers in ICU is to know when to heighten the importance of the objective and measurable dimensions provided by technology, and when to magnify the patients' lived experiences; to live and deal with the ambiguity of the technical dimension of care and the human side of nursing.

Keywords; Heidegger, Ihde, intensive care, nursing, philosophy, technology

Introduction

Technology affects everything and everyone. Even changes in language reveal its mounting dominance (van der Riet, 1997; Sandelowski, 2000). Is the face-off between nursing and technology one of irreconcilable opposition (van der Riet, 1997; Sandelowski 2000; Barnard, 2004)? Assuming an irremediable tension between 'object-subject' and 'care-cure' in nursing is futile Cartesian dualism (Walters, 1995). Theoreticians that either bless or blame technology or attempt to 'save' humane care in the face of a technological assault only beat the proverbial dead horse. At most, they serve to maintain a distinctive professional identity for medical personnel; but a dualistic thinking contributes nothing to improving nursing care (Barnard & Sandelowski, 2001). The challenge is to understand the meaning of technology and its relationship to suffering humans (Barnard, 2004). In particular, the challenge is to understand the ubiquitous complexity of technology within nursing (Sandelowski, 2000; Barnard, 2004). Simply stated, polarizing technology and nursing leads to a conceptual dead end. At root, technology is efficiency for efficiency's sake and a tool of control over nature. Apropos nursing, it is the power to control human life. As such, this power must be understood in an as thorough and sophisticated way as possible (Sandelowski, 2000).

Technology is a featured actor in ICU. Nursing-medical staff, specially educated to take care of seriously ill patients, necessarily must be equally trained to handle technological tools (Wikström & Sätterlund Larsson, 2004). The gadgetry is ambiguously both a support for and a burden to the staff members. Knowledge ripened during years of clinical practice, such as 'seeing' from the colour of his skin whether the patient is well saturated with oxygen, now takes back seat to objective measures and parameters. But the objective information that technological devices grant is only valuable when interpreted with understanding by a

professional aware of and sensitive to lived human experience (Walters, 1995). Nurses and physicians, no matter how impressive our technological equipment becomes, must never be reduced to technicians. Saying this is not expressing technological-hostility (Kemp, 1991). 'Good' technology provides information, gives parameters and saves lives. The human alone can utilize the data properly to prohibit human harm; the human alone can garner the promises of new possibilities for a richer existence. Technology does not require defence; it is equally foolish to damn it. The cardinal question, therefore, is what over-arching perspective would make the weave of human experience and sophisticated tools healthy and helpful, not damaging (Wikström & Sätterlund Larsson, 2003)?

Background

Western medicine arguably takes better care of physiological damage to the human organism than in any time in human history. Technological advances help build that claim. Within health care, the desire to heal seeks incessantly material and pragmatic ways and means to realize its goals. With the best of intentions, nevertheless, things can go awry (c f Walters, 1995; Wikström & Sätterlund Larsson, 2003; Lindahl, 2005). We performed two phenomenologically-oriented qualitative studies (Almerud *et al*, 2007a; Almerud *et al*, 2007b). These studies elicited the experiences and meanings both of being an ICU patient and of caring personnel who labour in the same environment. First, we report the major findings of those studies. Those results ground the reflections and hyper-reflection that constitute the research method of this study.

Technology in practice

Despite being constantly monitored and observed, intensive care patients express that they feel invisible as people, reduced to the status of organs, objects, or diagnoses (Almerud *et al*, 2007a). Unwittingly, within the highly technological environment the patient and the apparatus meld. They form a unit, one item of monitoring and regulation. The roar of technology in the setting silences the sick person's utterances about real and shifting needs. How does this strange silencing which renders the patient invisible occur? While demonstrating keen vigilance over technological devices and measured parameters, caregivers pay scant attention to patients' timid attempts to tell stories and share experiences (ibid).

From the caregiver's point of view, contradictions also mark the care-giving comportment. In the classic Hegelian sense, master-slave dynamics rule in the technological intense environments. A malaise settles on caregivers as they strive to garner the security that technology promises. Yet simultaneously, insecurity creeps in as they read/observe the patient's biological data. Technical tasks take precedence over and seemingly are more urgent than showing care. Listening, inspiring trust, and promoting confidence no longer have high priority. In 'moments' of cynicism, it feels that nursing only starts after the session of 'babysitting' the machine to which the patient is attached is complete. Trying to communicate 'through' technology is so complex that keeping in perspective what or who is the focus for 'seeing' or caring is a difficult challenge (Almerud *et al*, 2007b).

Technology rules the hospital milieu and dominates caregivers because of *Gestell*, the striving after efficiency for efficiency's sake (Heidegger, 1954/1993). In the classic Hegelian sense, master-slave dynamics rule in the technological intense environment. Hegel (1974) demonstrates most trenchantly that it is in the trembling eyes of the slave that one sees one's

mastery, and that the commanding gestures of the master show the slave his/her role. He shows also that the predicament swiftly can change (ibid). In more concrete clinical terms, who is 'agent' and who is 'patient' is just an interaction or a decision away. When it comes to a nurse monitoring a patient by monitoring a machine, master-slave dynamics easily scramble the events of the 'moment'. One who is 'in charge' by job description and intention, suddenly has been turned into a slave of whatever calibrates. These dynamics constitute a peculiar stress for the caregivers. Technology beleaguers them; they become careworn (Almerud *et al*, 2007b).

Technology in theory from the perspectives of Heidegger and Ihde

Martin Heidegger (1954/1993; 1962) is the seminal and decisive thinker about implications of technology. Heidegger explicitly and relentlessly thoroughly probes the philosophical status of technology. He appropriates Husserl's concept of intentionality takes it to level of existence. Thus he replaces western rationalism - with its absolute preference for separated sub-stances and monologue - with a radically relational, dialogal point of view. His unique perspective on technology, although far removed from the mundane matters of nursing, provides the lifeline for the joining technology and nursing care into their inherent fittingness (ibid). Don Ihde (1990; 1993; 2002) is a contemporary phenomenologist who has grappled with Heidegger's thought. Ihde forks in a different direction from Heidegger by interpreting technology and adapting it in light of our contemporary situation of postmodern Information Technology. Although Ihde does not address directly the nursing predicament either, his reflections also go so deeply into the matters that they forward our reflections and hyper-reflections (ibid).

Rationale

Our solid claim in this study is to do something thoughtfully, not in the run-of-the-mill pragmatic manner. Rather, the first thoughtful step is to heal the separations, the divisions, the antinomies. In the high tech wards, nursing and technology are equal values, indispensable to one another. Put differently, they are part of a figure/ground unified structure. Our method of hyper-reflection - a method designed to reach general, structural conclusions - focus upon not technology itself, but the attitude of technology, Gestell, as it manifests itself within the intensive care milieu. Merleau-Ponty (1964) uses the term "hyper-reflection" to alert us that our thinking always doubles over on it self and in the process shows us how we are part of the very field we study. Simply put, we will reflect upon our reflections. The aim of this study is to find from a philosophical point of view a more comprehensive understanding for the dominance of technology within intensive care.

Hyper-reflection and discussion

As stated earlier, our starting point is two qualitative empirical studies conducted in ICU (Almerud *et al*, 2007a; Almerud *et al*, 2007b). We interpret their results, utilizing the empirical literature to elucidate them. The confluence of results constitutes the grist for the mill of our hyper-reflection on technology guided by the reflections of Heidegger and Ihde. In this study, we focus upon the master-slave dialectic and thus the absorbing and seductive power technology seems to have on both the critically ill patient and the ICU caregiver.

In ICU, the physical body becomes measurable and, to some extent, predictable and controllable. The technology of the ICU gives primacy to information displayed in graphical or numerical forms (Almerud *et al*, 2007b). When we are a patient, our objective body - the body that we have - is cable-connected to apparatuses such as a monitoring device. Caregivers

demonstrate keen vigilance over technological devices, documented data, laboratory results and measured parameters. The twist concerning vigilance and invisibility creates an alienating collision. Instruments confirm treatment status and progress. Further, the physician registers objective data and then uses it as the criterion for telling the patient apodictically how he feels. Monitoring closely the early critical periods is vital. Careful observation does indeed promote a feeling of security (Almerud *et al*, 2007a). Being able to "see" how the patient is, on a monitor, is central. Technology is perceived as a simple tool for continuous monitoring and exact communication of data (Almerud *et al*, 2007b).

Silence shouts. Absence is a mode of presence. These two modes index of the way technology rules the ICU milieu. Caregivers as well as patients take the machines for granted in the ICU but rarely discuss their invariant and alienating impact with each other. Patients obediently give themselves over to the technologically-driven regimen of the unit. It is as if the act of trying-to be-a-good-patient would promote safety. All too soon, however, it flips over. Patients sense extreme vulnerability when realizing that the 'good hands' into which one has put one's life turn out to be mostly an extended arm of technology (Almerud *et al*, 2007a). In those hands, one is not being held and handled, but ambiguously suspended in a holding pattern (Winnicott, 1965). Blind trust in technology ultimately does not inspire confidence or promote hope for healing (Almerud *et al*, 2007a).

The dictates of technology locates the caregiver atop and patient at the bottom rung of an implicit and explicit hierarchy. Instead of sharing a vibrant alliance with caregivers, the patient melds with the apparatus. (S)he and the machine form a unit that consists of parameters and results which the nurse and physician regulate and read. This describes the visible-invisibility ambiguity that hallmarks the patients' experiences as alienating (ibid).

Technology also 'enslaves' the caregivers. With its exciting captive lure and challenging character, technology seduces the caregivers and lulls them into a fictive sense of security and safety (Almerud *et al*, 2007b). According to Heidegger (1962), technology absorbs us and becomes the pivot of our operations. Ihde (1993) suggests that this process of absorption magnifies the objective aspects of human life while reducing the subjective qualities. But here, too, comes a flip. Caregivers, who have sophisticated medical training that is augmented by clinical experience, soon realize that the machines are not a panacea. They are also flawed. They know their knowledge cannot be continually overlooked without something going amuck (Almerud *et al*, 2007b).

It is vanity gone awry and sheer hubris to imagine that we can control technology, much less halt it. Technology is the perennial human possibility of creating, building and bringing forth. In our age, it shows as virtual reality, cyberspace, information highway, etc. Technology is such a part of every social environment that it has become coincidental with life (Heidegger, 1954/1993). It is on that basis that we take Heidegger's hammer in order to hammer home the point: All human-technological relations flow two-ways. "Insofar as I use or employ a technology, I am used by and employed by that technology as well" (Ihde, 2002, p 137). "So long as we represent technology as an instrument, we remain transfixed in the will to master it" (Heidegger 1954/1993 p 337). Values are at stake. It contributes nothing to put the finger on the already well documented tension that caregivers feel pinched between caring and monitoring technology. The enlightening act is to stop the polarization (Almerud *et al*, 2007b). Technology dominates the ICU milieu, but by the same token, nurses totally monitor technology. There can be no other way. Balance is requisite (ibid). The Hegelian master-slave dialectic can be halted.

Kelman in Barnard (1997) spells out the powerful reasons why both patients and caregivers take the effectiveness of technology for granted and to that degree exhibit a deficit of awareness. The nurse, being so close to the centre of power and decision-making process, easily identifies with the authority system and becomes swept up in the glory and mystique. In a highly technicised ward such as an ICU, all eyes, even the family members are focused on the machinery, not on the patient. In part, this is the seductive power of technology: "It requires effort not to watch the monitors" (Cassell, 1991, p 22). The essence of technology is not technological. *Gestell* is the striving after efficiency for efficiency's sake. It pursues efficiency not only for the sake of the products it will bring forth, the money it will generate, or the power it will garner. The attitude of technology seeks efficiency to be ceaselessly efficient (Heidegger, 1977). So easily it spins out of control and proliferates, that it blurs the radiance of all other ways of coming-to-presence and swallowing other values.

Final reflections

To be-or-not-be is a non-question concerning technology; it is a burning question for humans. Borrowing from mythology, we can say that technology shows a Janus-face. We must stare this visage directly in the eye to ascertain what is potentially regressive about it and what potentially progressive and to distinguish when we better look at it and when it is best to look away from it. In all honestly, the human being, the clinical caregiver, shows a Janus face too. "Technology is not demonic; but its essence is mysterious" (Heidegger, 1954/1993, p 333). We might say the same about people.

Ihde's focus on vision and the possibility of double vision is felicitous. It points clearly way toward holism not dualism. Polarization creates an intellectual and practical impasse. Medical

technology does not have to deprive patients of their individuality, subjectivity and dignity. The careless use of technique and the technological attitude adopted by nurses have made the profession too technological, not objects or machines. The problem of technology in health care lies in the choices made about what is humane and dignified care. It is the meaning ascribed to machines that matters; it is the way the embodied patient is handled, either with care and holistically or with the body reduced to an object and treated merely with technological competence (Barnard & Sandelowski, 2001; Lindahl, 2005). The body should be treated as a whole (Kemp, 1991). There are times a nurse concentrates on the objective measurements displayed on the monitoring equipment to the detriment of humanistic caring. But in a life-threatening emergency, she needs technology to provide objective information about physiological processes. It is lifesaving (Walters, 1995).

Heidegger (1962) gives us the paradigm. The hammer for the cobbler is ready-to-hand. It is an ordinary extension of the craftsman's arm Heidegger (1962). So too, the hockey stick or the baseball glove for the sportsman, or for the musician and his violin. By mastering the 'tool', it ceases to be an object and becomes an extension of the user's arm (ibid). If, on the other hand, there is a break between the player and his bat or club, a split between the jazz musician and his horn, all that shows is a bad play and a bad note sounded. The praxis of nursing, which includes handling tools, can embody them similarly: ready-to-hand. When the unity exists, the technological object then blends into the background and becomes part of the total picture. In the clinical case, apart of the process of caring. Stated somewhat differently, the object becomes phenomenologically transparent (Walters, 1995). When the technology malfunctions, it exists as present-at-hand, phenomenologically opaque. But instead, sometimes the caregiver becomes an extension of the machine (Almerud *et al*, 2007a). Thus, ending up absorbed, beleaguered by technology.

Another way to amplify this point is to indicate that the meaning and value of technology is contextual, belonging to some lifeworld situation (Ihde, 1990; Sandelowski, 1996; Barnard, 1997). The nurse uses some gadget in such a way to bring her closer or drive her away from her patient (Barnard, 2006). For example, while checking the screen to make sure the top line does not go level is indeed the bottom line in a situation of critical or life-threatening illness. That serious monitoring does not have to obscure the nurse's sensitivity to see the suffering human. Likewise, physicians can get "stuck" in handling technological devices by routine, solely manipulating buttons and technological adjustments such that they co-draw a vicious circle, within which they treat 'bad' laboratory test results, not sick patients (Lindahl, 2005; Almerud *et al*, 2007a). Technology is being served, not another human being. From a Heideggerian standpoint, claiming that any technical device is inherently good or evil would be empty chatter. Efficiency will not be cancelled out as value. We have been so primed that we will not cease to believe that technology does it better. The complexity of technology that makes mastering it difficult, and the effort it takes to flawlessly manipulate multiple numbers of machines and tools such to fulfil the requirements of protocols, only adds to its mystique (Barnard, 1997). But technology can never replace human touch, closeness and empathy (Almerud *et al*, 2007a). Both technology and caring relationships are of indispensable value and the role of the carer can never be substituted by any kind of machinery. Technological precision and care are both of indispensable value. They must be integrated. The way to value them equally, is to understand their essential belonging-togetherness. Polarization is an intellectual and practical dead end. It does not suffice to complain that caregivers feel pinched between caring and monitoring technology. The enlightening act is to stop the polarization and to heal the separations, the divisions, the antinomies. In the high tech wards, nursing and technology are equal values, indispensable to one another. The machine, to have any worth as

a tool, requires human expertise. It is a question of balancing state-of-the-art technology with integrative and comprehensive care, of harmonizing the demands of subjectivity with objective signs (ibid). Ambiguity abounds in the modern/postmodern technological intense environment. Juggling the 'moments' of being master or slave, of being secure in insecurity and insecure in security, caring for a patient and monitoring a machine are mind-boggling and heart-rending chores (Almerud *et al*, 2007b). Technology drives treatment and co-shapes care giving attitudes to the extent that it may impede any possible close encounter and sabotage the intention of developing health-inducing interpersonal relations. Caregivers need to be aware that the roar of technology silences the subtle attempts of the critically ill or injured person to give voice to his or her needs.

Conclusion

In the light of our hyper-reflection, we see that the flaw is not turning to the device per se, it is the turning away from the person. Transforming patients into ciphers, albeit unwittingly, is contra-therapeutic. Technology should be a catalyst; do its 'thing' and withdraw 'unnoticed'. Technology ought to increase closeness, not to create distance. Nowadays, it is figural, the presumed ultimate problem-solver, which subtly and gradually erodes our faith has been d in our closest 'instrument' – ourselves who talk to the patient; our hands with their healing touch; our hearts which give comfort and solace. The challenge for caregivers in ICU is to know when to heighten the importance of the objective and measurable dimensions provided by technology, and when to reduce the importance of the objective dimensions and magnifying the patients' lived experiences. Reforging the broken bond between techne and poesis would be the creative act in terms of caring and nursing and to resolve the ambiguity that lies in caring in technological intense environments. To live with the ambiguity of the technical dimension of care and the human side of nursing and to not let ambiguity lapse into

ambivalence. The challenge for ICU caregivers is to stop and reflect upon when to do what; to

have the courage to stay rather than to submit to the ambivalence and split.

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