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Review Article

Patients' Experiences of Technology in Care: A Qualitative Meta-Synthesis

Abstract

Technology has conquered the world and also health care as a part of it. It has stated that patients' needs and expectations have not been taken into account when using technology. From caring science point of view it is a problem to leave patients' experiences without attention. By summarizing the past qualitative studies of patients' experiences of technology in caring, the aim is to highlight the patients' perspective and increase knowledge of their experiences of technology in caring science and care as a basis for theory development. The purpose of the study is to describe patients' experiences of technology in caring. The main study question is: How do patients experience the technology in caring? The sub-study questions are: Which of the patients' experiences are caring, and which are non-caring. The results indicated that patients considered technology as a necessity or a device. Caring and nursing in the context of technology is perceived as good and caring when the technology is secure and easy to use, caring is competent and holistic, and patients' dignity is respected. Technology is perceived as non-caring when the focus in caring is only on technical interventions. More qualitative studies describing patients' experiences of technology in care are needed.

Abbreviations

IT: Information Technology; ICT: Information Communication Technology; EBCD: Experience Based Codesign; WHO: World Health Organization

Introduction

The purpose of the study is to describe patients' experiences of technology in caring. The main study question is: How do patients' experience the technology in caring? The sub-study questions are: Which of the patients' experiences are caring, and which are non-caring. By summarizing the past qualitative studies of patients' experiences of technology in caring, the aim is to highlight the patients' perspective and increase knowledge of their experiences of technology in caring science and care as a basis for theory development. This study aims to develop the theory and practice of ethical caring in the world which is increasingly dominated by technology.

Background

Alexander & Stagers [1], stated in their systematic literature review that patients' needs and expectations have not been taken into account when using technology in care. O'Keefe-McCarthy [2], stated in her study that the use of technology marginalizes patients' experiences and has a negative impact on patient care. From the caring ethics and caring science point of view, it is an ethical problem to leave patients' experiences, the potential harms to patients, and users' needs without attention. In these cases patients' dignity is easily threatened and therefore patients experience suffering [3-5].

In caring science the fundamental basis is that the human being is an entity of body, soul and spirit, s/he is holy, and this is why the dignity of a human being is absolute and unique. The core of caring ethics is to respect and dignify the human being, his /her good, autonomy and experiences in relation to health, sickness, suffering and care [5,6].

Technology has conquered the world and also health care as a part of it. It has been easy to blindly accept technology as part of care because of the absolute benefits that technology brings to care [7]. Moreover, it is evident that environments that highlight technology and use it a lot have a tendency to concentrate on technical skills rather than on patients' psychosocial or spiritual needs. The alleviation of suffering and a deeper understanding of patients' needs are put aside when practical interventions, efficiency and the economics of organizations are highly valued [8-10]. When the patients' needs and expectations are not in the focus of care, their dignity is easily injured; as a result, ethical, truly caring care is not realized [3].

In this study the concept of technology is seen to cover the technological applications used in patient care, which the patient can also use independently after patient education. Technology and technological applications are regarded as technical systems, devices and machines, i.e., hard technology enabling the support and care of patients' basic daily needs, vital functions and communication needs, or the use of devices in patient education or information, or devices providing easier access to health care services.

Related literature

Past nursing and caring literature has studied and described how the use of different technological tools affects patients' experiences of illness [11,12], patients' experiences of getting information from health care personnel or websites [13-15], how technical tools fit in the nursing purposes, such as patients' follow-up services [16,17], or how the technical tools affect patients' coping skills compared to traditional support and educational methods [18]. The focus of the studies has been on illness, i.e., other than the patients' experiences of technology and its use in their care. Bowling et al. [19], have performed a literature review and psychometric testing of a measure of patients' expectations and their satisfaction in health care. The results showed that of 266 abstracts, 211 were literature reviews. The empirical studies

seldom had a theoretical frame of reference, the study samples were small or were selected on the basis of convenience, and the origin of the study questions was not presented and they remained untested. The results focused on the general expectations and experiences of patients. Most of the patients expected cleanliness, information and advice on where to go, information about their health and condition, the cause of their illness and its management as well as the about benefits and side effects of their care and treatment. Patients expected to have an opportunity to discuss with physicians and health care personnel, and they wanted to be treated with dignity and respect. Patients expected convenient and punctual appointments, helpful staff and understandable knowledge, and the possibility to be involved in caring decisions. As could be expected, patients wanted to get help and experience a reduction in health problems.

When developing new technical systems, such as information technology (IT) based services, devices and robot use in health care, the focus of the documentation is on technical solutions and processes. Patients' experiences of the use of technology, such as robots and videoconference systems, are described as "exciting". Patients and families have been reported to be pleased with the possibility to discuss with the health care personnel in a timely manner, even at odd times of the day [20]. The framework of value sensitive design has been developed in engineering sciences [37], in the context of care-robots design. The value sensitive approach offers a tailored tool and framework to robot designers in caring context. The aim is to ensure that the ethics is included in the designing process. The model is described to be care-centred and the focus of the model is in care. The components of the model are: context (the place of care), practice (caring intervention), involved actors, type of robot, and manifestation of moral elements (responsibility, responsiveness, competence and attentiveness). The values of World Health Organization (WHO) has been named to be the theoretical basis of the ethics in the model but the patient and his/hers dignity are not the core and starting point of the framework. The framework has also been criticized of the lack of clear determination of the concept value, lack of clear methodology, and also the risk of naturalistic fallacy has been identified [38]. Robert et al. [39], have presented a practical approach called experience based codesign (EBCD) to systematise the use of patient experiences in the quality development of health care services and devices. The approach is promising attempt to add patients' active role and partnership in care, but the theoretical and ethical basis is not clear.

The results of the Cox et al. [12], study indicate that patients' experiences of the use of technology proved good (average 8.24 on a scale of 1 "dreadful" to 10 "excellent"). In this study, the telephone was the technology used in a nursing intervention, a telephone follow-up of cancer patients. Of 44 patients, eight (18%) preferred an appointment with a physician or a nurse instead of the telephone intervention. These patients valued face-to-face interaction with the health care personnel. From the perspective of patients, the advantages of using telephone follow-ups included the established relationship with the nurse whom they had met earlier, topics of discussion which could be more sensitive compared to a busy outpatient clinic, the comfort and convenience of staying at home instead of wasting time on traveling, feelings of having more time to discuss and not being

rushed. In addition, easy access to care, i.e., your nurse calling you, and the speed of referral were valued.

As Ziebland et al. [11], have stated, in general only few of the health science studies dealing with technology are qualitative and present the authentic voice of patients. In most cases the patients' experiences have been reported by using structured questionnaires, or by measuring the change before and after the intervention in the context of technology. The conclusion of the studies presented that more research and knowledge is needed to improve the quality of health care services and staff's awareness of patients' expectations and experiences. The existing knowledge of patients' experiences is patchy. By summarizing this knowledge, the aim is to highlight its meaning as a basis for ethical caring.

Purpose and study questions

The purpose of the study is to describe patients' experiences of technology in caring. The main study question is: How do patients experience the technology in caring? The sub-study questions are: Which of the patients' experiences are caring, and which are non-caring.

Method

Study design

To meet the aim of this study, qualitative meta-synthesis was chosen. It accounts for important similarities and differences enabling the study of patients' experiences. As a method, meta-synthesis is based on interpretation. The raw data consisted of findings of the journal articles included in the study. They were first interpreted by answering the study questions. Then, the interpreted answers were synthesized by tabulating the descriptions of patients' experiences from the original single studies, and the interpreted explanation was described in findings, categorizing them from the perspective of the study questions, and described as themes according to the similarities and differences of the meaning of the patients' experiences [21,22]. In this study the interpretation horizon is caring science and the Caritative caring theory and its fundamental basis viewing the human being as a whole, unique, autonomous being, who is able to experience phenomena. Ethics form the core of caring. This study focuses on the patients' experiences of dignity and suffering in the context of technology in care. The patients' experiences in the study material are interpreted based on the theory of caring science by studying the dimensions of patients' experiences of technology and their experiences of care in relation to patient dignity and suffering in the context of technology. If the experience of care is not good, non-caring, it equals suffering related to care. Patients' suffering can also be related to illness or life [5,6]. The connection between the interpretative explanation and the study material is illustrated by using quotations based on the results of the single studies [22].

Material search and selection

To distinguish patients' experiences of technology in caring and nursing, the material search was carried out with Medline[®] and CINAHL databases using the following search terms: technology, technolog*, nursing, nurs*, caring, patient*, experience* and including related terms. As a search strategy, advanced search was



employed with the restriction of limiting the material to the period between the year 2000 and December 2014 and limiting it to those journal articles which were published in English, were empirical qualitative or mix-method studies and which were evaluated as a five-star source by the database. According to the inclusion criteria, articles had to be peer-reviewed and focus on patients' experiences in the context of technology in care. These criteria ensured the similarity of the material required by qualitative meta-synthesis. Furthermore, the setting of inclusion criteria and determination of methodological comparability were realized as required [22].

Medline[®] provided 197 journal articles, while the CINAHL search resulted in 39 journal articles. In total 236 articles were selected. After applying the inclusion criteria to the titles and abstracts, 25 articles were selected for the first screening. They were carefully read through and their content was evaluated from the viewpoint of the study questions. In addition, methodology was evaluated to be qualitative describing patients' experiences in their own words. After completing this evaluation, articles were included, analyzed and interpreted. The screening process revealed many duplicates. After excluding the duplicates the study material included six qualitative and two mixed method empirical articles. Of the two mixed method studies, only the results gained by qualitative methods were analyzed and interpreted. A hand search from the reference lists and journals was done during the study process. Three articles were included with this method, increasing the total number of articles to 11.

Qualitative meta-synthesis

Synthesizing qualitative research studies is one method to achieve the aim of providing patients' perspective and increasing knowledge of their experiences of technology in caring science and care as a basis for theory development. This method ensures that patients' perspective can be taken into account, and that patient-centeredness and ethical care can be promoted in caring science and caring in the context of technology [22,23]. By summarizing the findings of qualitative studies describing patients' experiences of technology and care, by doing a thematic description of patients' experiences of technology and care, and by giving an interpretative explanation to them, the aim is to establish the foundation for knowledge development and utilize the existing qualitative studies as a basis for theory development. When aiming at knowledge and theory development by utilizing the findings of single qualitative studies, the findings need to be summarized (Table 1) and positioned in the large context by means of interpretation [22]. In this study the interpretation was done from the perspective of the Caritative caring theory, its conceptions of the dignity of a human being, patients' experiences of caring, or non-caring, which is related to suffering [5,6,10].

Findings

Patients' and families' experiences of technology: The patients and their families experienced technology in two ways: as a necessity, or as a device making their life and caring easier. These two different meanings of technology have been mentioned in the material despite the experiences of technical problems, difficulties, and demands for knowledge and skills required by the use of technology. In general, technology was perceived as positive [24-34].

Technology as a necessity: Technology as a necessity was used to describe devices and caring interventions that sustain life, compensate lost body functions or postpone death. Examples of these devices are ventilators, dialysis machines and peritoneal dialysis devices, gastrostomies and other forms of tube therapies, intravenous drug therapies, pumps and pacemakers. The view of this kind of technology is connected to the myth of technology as a miracle [24,28]. The patients described the relation between their body and technology as an alliance and a mixed blessing. On the one hand, it is lifesaving treatment, but on the other hand, it is meaningless exertion. The dependence on technical devices places the patient between living and dying, making them more aware of the situation than usual [24,29]. Heaton et al. [28], described the dichotomy experiences of technology with the words of a technology-dependent child: " ... *there are bad days but there are also good days...*" The children saw that although the caring routines, i.e., the use of devices, made them tired and limited their life, their health and quality of life benefited from the use of technology, and it made their parents' life easier. Patients felt that technology eased symptoms such as breathlessness, unstable heartbeat, loss of consciousness and the inability to be active. A patient who started daily dialysis treatment instead of having treatment every two days described this experience as follows: " *I feel wonderful, have more energy and time to spend in my life since I started daily dialysis*". More energy meant independence and the ability to be more active, increasing the feeling of self-worth. Patients' depression subsided and the idea of ending the therapy changed into a feeling of life being worth living [24,26,28,29]. Technology-dependent patients experienced feelings of uncertainty in relation to technology, hoping that the technology would work, while fearing that the electrical devices would interact with other electrical devices or that they would give off an unexpected alarm or cause an electric shock. When building up confidence in technology, the technology-dependent patients and families wish and look for technology that looks nice and is flexible, easy-to-use, safe and secure. Patients and families appreciated the new technology they were able to use at home instead of the hospital. They expected good access to new and well-designed technology [24,28,31]. The ventilator-dependent patients expected to have a spare respirator in reserve and hoped for round-the-clock telephone support. Technical problems with the devices had a negative impact on the patients' experiences of their body control, personal competency and social acceptance as well as their feelings of safety [31,32]. Families experienced that technology demanded a lot of knowledge and skills. Parents had feelings of conflict between the necessity of technology and being scared of harming and hurting their child or significant other with devices and interventions [30].

Technology as a device making their life and caring easier: Technology as a device making their life and caring easier described devices that made the patients' or families' everyday life easier or more convenient, or made the use of health care services easier and increased the patients' ability to manage their own care. In this study material, these devices were information and communication technology (ICT) devices such as telephone, videophone, smartphone, and information and communication technology applications that can be used by personal computer. The patients experienced the use of this technology to be "*quick and easy, it reduced the number*

Table 1: Patients' and their families' experiences of technology in care in the past literature (example of tabulation).

Author, year, country, Journal	Design and purpose	Material and method	Results, patients' experiences of technology including patient quotations in italics
Fincher, L., Ward, C., Dawkins V., Magee V., Willson, P. 2009. USA. Journal of Gerontological Nursing	To determine the usefulness and usability of telehealth (telephone and videophone) medication counseling for Parkinson's disease research education and clinical center patients. Mix-method evaluation study.	Qualitative data were collected by three open-ended questions: 1. What were the advantages of your telehealth counseling session? 2. What were the disadvantages of this session? 3. Would you comment on your feelings and experiences with your particular telehealth intervention? The qualitative analysis was done by answering to the three questions based on handwritten texts of the answers. The data was collected from three25 patients' treatment groups: in-person, telephone and videophone.	Most of the patients replied that the experience of using telehealth devices was positive. The learning method was described as convenient, supportive and reinforcing. The disadvantages included technical problems and problems with timing of the videophone reception. The answer to the study questions was provided in three themes: time, education on the disease by expert staff, and technology. Telehealth device intervention was described as " <i>quick and easy, it reduced number and duration of visits, including travel!</i> ". The patients expressed that it was easy and nice when they did not have to go to the clinic for an educational session. The patients appreciated the nurses who participated in the telehealth sessions. They were regarded as experts and supportive. The patients felt that their ability to self-manage their disease improved. " <i>The nurse was knowledgeable about my medications and side-effects to be aware of....the nurse did a very good job.</i> " " <i>It made me aware of how high protein diets affect the Levadopa that I take.</i> " The nurse-patient relationship strengthened and supported learning as did relaxing home environment. " <i>It is very reassuring to know I have someone to talk to who will listen....It encourages me to take stock of progress I'm making in specific areas.</i> " The telehealth technology in the intervention was phone and videophone. The videophone was considered very good because the nurse could see the patient and the symptoms s/he had and determine the state of patient's health. Visualization of contact was valued despite some technical problems: poor reception, problems with connection. " <i>Connection sound was not always good... the reception was choppy.</i> " " <i>I had to call three times before the picture was clear.</i> "
Ingadóttir, T.S., Jonsdóttir, H. 2006. Iceland. Scandinavian Journal of Caring Science	To describe patients' and families' experiences of long-term home treatment with noninvasive ventilation during sleep. The study question focused on what were patients' and families' experiences of being dependent on technical breathing assistance during sleep.	Semi-structured interviews of six patients who had been dependent on noninvasive ventilator treatment during sleep for at least six months and their spouses (5) and a daughter (1). The material was analyzed in themes by using interpretative phenomenology and narrative analysis.	At the beginning of the ventilator treatment, the care was experienced as constraining and intrusive. Later the treatment was considered helpful resolving difficulties. The study points out how crucial it is to explain the purpose and implementation of the treatment to the patients and their families at the beginning of the care. The care should also focus on patients' and families' unique needs and dignity in the context of technical treatments. The narratives of experiencing the dependency on technology were themed in six categories: mixed blessing between life-saving treatment and meaningless exertion, compassion and understanding of the use of complex technology, body listening, a want to be seen healthy, the dominance of technology, and the treatment making it possible to work. The experiences of patients treated with ventilator varied. The experienced benefits of the treatment played an important role when adapting to the treatment and it indicated the importance of how to introduce treatment and how to adjust it to the patient's life. Respecting the human rights, such as freedom and self-determination, and compassion were important for the patients and their experiences of caring or non-caring. To be heard and respected as an expert of self-care or family caregiver proved an important part of the caring interaction. In the patients' and their family members' experiences, the health care professionals decided when the ventilator treatment was started, thus ignoring patients' and their family members' needs and preferences. It was also difficult for the health care professionals to accept when technology became a burden to the patient and did not benefit him/her anymore.

Kirk, S., Glendinning, C., Callery, P. 2004. UK. Journal of Advanced Nursing	To discover how parents experience caring for a technology-dependent child. Grounded theory techniques.	In-depth interviews of parents of 24 technology-dependent children in home care. Technology dependence included tracheostomy, oxygen therapy, mechanical ventilation, intravenous drugs, parenteral nutrition, peritoneal dialysis, and others such as gastrostomy. The data were analyzed by using the constant comparative method. The data collection and categorization occurred concurrently with codes and categories, which were inductively developed. The sense of the whole story was the focus of interest and similarities and differences were coded using the NUD*IST computer program. The coded data were examined and clustered to create categories, which were further compared and contrasted to create more inclusive categories.	Parents experienced the meaning of home changed because of technology. The home environment was medicalized by the presence of equipment and home caregivers. The parents felt their parenting took place in a "mini-hospital" instead of their home. The home environment was dominated and organized by technology, thus changing the family life. The presence of technology and home caregivers and other professionals limited their privacy, freedom and social life as families. The family caregivers experienced caring meant carrying out instrumental activities with technology, demanding a lot of professional knowledge and skill, but also caring for a person lovingly. Following necessary procedures, such as giving suck outs causing pain and discomfort to one's child, resulted in conflicting feelings for parents. Despite parents knowing that the treatment was necessary for their child, they feared for harming their child. The strong and constant emotional commitment to the one who you care for is demanding and mistakes are not allowed. Parents expressed they were experts of their child's care because they had the overall knowledge of the entire care of their child. They had the specialized medical knowledge of their child's medical history and condition; they had the knowledge of medical technology used in the everyday caring, and they knew their child as an individual. Parents felt that this experimental knowledge of them was not valued by professionals. Technical machinery required technical competences, and the ability to make decisions. The use of technology in home also shifted the parents' roles and responsibilities. The need to discuss the feelings and experiences and to get support when caring for a technology-dependent child at home was of vital importance.
Macduff, C., West, B., Harvey, S. 2001. Scotland. Nursing Standard	To develop and evaluate a nurse-led telemedicine service linking the senior citizens of a rural area with a town-based general practice during a six-month period. The study identified the user feedback and experiences of the strengths and weaknesses of the telemedicine service. The data were collected from patients, physicians and nurses, who had participated in the video link sessions with a video display screen, microphone, keyboard, loudspeaker, telephone handset and a camera unit.	As part of the mix-method study, an interview of seven patients who had participated in video link sessions during the six-month period.	Patients' comments on the telemedicine experience proved positive. "I was amazed how easy it was to see the doctor." "Most convenient." "Appointment on time, unlike..." At first the video consultation was a strange and somewhat unnerving experience. Some of the patients felt uncertain about what to speak to the camera. The help of the nurse with the technical equipment was found important and even essential. All the interviewed patients expressed they would use the service again because of its convenience. In some cases the quality of the camera, picture and sound proved unsatisfactory. The patients experienced the role of the nurse to be that of an interpreter between them and the physician. The jovial personality of the health care personnel facilitated the use of the service. Patient education and the nurse's repetition of the information after the video consultation session increased understanding the information.

and duration of visits, including travel". They described patient education via telehealth technology to be convenient, supportive and reinforcing [25,27,32,33]. The patients felt that their ability to self-manage their care and medication improved after the learning sessions using telehealth devices. In particular, the patients appreciated the videophone, because the nurse could see the patient and his/her symptoms and determine the state of the patient's health. Although the technology of visualization was not faultless and there were many problems, patients experienced it as good, even vital. A patient described technical problems in Fincher et al. [25], as follows: "Connection sound was not always good... the reception was choppy. I had to call three times before the picture was clear." Similarly, in Lundberg's [32], study on how ICT devices support family caregivers, the videoconference system was found to be helpful because it offered a connection to other family caregivers and health care staff. Family

caregivers experienced isolation and wanted help for that. In the study of Haze & Lynaugh [27], teenagers described their experience of using a smartphone application as part of their asthma care. The text message application was perceived as good because it made the communication and caring relation between the nurse and the teenager easier. It was easy for the teenagers to ask more questions, and they felt that the response to their questions was quicker. In addition, the patients could use text messaging at a time most convenient for them. In the study of Macduff et al. [33], the patients also described the telemedicine services as easy and convenient. They appreciated the fact that the appointment with health care personnel was realized on time, and the staff had time for the patient, unlike in hospitals.

Patients' and families' experiences and interpretation of good care in the context of technology: According to Mendes [34], good and ethical caring in the context of technology demanded technical

competence and skills, including critical thinking skills, of the nurse and other users. In regard to nurses, the patients expected professionalism including a holistic caring vision and the ability to confront the patients and their family members with dignity and respect. Moreover, the nurse needed to “fit in” in when the patient was cared for at home. The parents of a technology-dependent child described the good caring experience as follows: “*The first nurse we had...she provided us a lot more than just Courtney... she provided us with a lot of emotional support in those first, that first year... The key was that she was not afraid of Courtney. She treated Courtney like a human being...and that process of doing that made us feel like Courtney's OK.*” The competent nurse with critical thinking skills was described as follows: “... if they can think on their feet, they will probably see an emergency coming up or a potential of one. To say: He's not himself, he's just not right.” The technical competence and skills are an important part of nursing competence. However, the parents of technology-dependent patients emphasized a holistic approach and its importance.

The patients and family caregivers expressed how crucial the initial stages of using technology in their or their family member's care are for them. This stage includes how successfully the purpose and implementation of the treatment is explained to the patient and how the patient's dignity and unique needs are taken into account. The possibility to test and practice the use of the technology in a safe and positive atmosphere promotes the caring and use of devices. The compassion and understanding of the health care personnel manifested itself as adjusting to the needs of the patient and their treatments and it was regarded as an important foundation for the use of technology [29,31]. The help of the nurse with technical equipment proved essential, as did the nurse's role as an interpreter between the patient and the physician or between the patient and technology. The role of the nurse was highlighted especially in the beginning, because patients experienced the use of technology as strange and unnerving, making them uncertain. When the patients got off to a good start with the support of the nurse, they were again willing to use the technology and found it convenient and helpful [33].

Patients' experiences of ICT devices in patient education proved good and caring because these devices made patients' everyday life easier. The same applied to the use of health services. Utilizing the devices was quick and easy, and patients found their use to be convenient, supportive and reinforcing. Patients valued having education from an expert nurse who was familiar with them. Moreover, nurses could repeat and interpret messages and advice that physicians gave them. A patient described this as follows: “*It is very reassuring to know I have someone to talk to who will listen... It encourages me to take stock of the progress I'm making in specific areas.*” Patients appreciated that they were able to put questions to the nurse at a time most convenient for them and receive immediate feedback compared to traditional services. They valued the opportunity of using the services in a relaxing home environment instead of traveling to the clinic. The interaction and relationship with the nurse was strengthened, thus supporting learning and encouraging patients' self-care [25].

Patients' and families' experiences of non-caring and suffering

in the context of technology: The patients and their family caregivers experienced powerlessness, frustration and even anger because they felt that their expertise, needs and preferences were not taken into account when making decision in care, e.g. starting a treatment involving technology or ending a treatment when it no longer benefited the patient. The patients and their family caregivers found it crucial that their experiences and needs be heard and taken into account when making decisions in care. When patients' expectations and needs in decision-making were ignored, patients found it difficult to commit and adapt to the treatment. They felt that ignoring them was an insult against their human rights, freedom and self-determination. In patients' view, they were treated disrespectfully if they were not heard [24,29,31,34]. This is illustrated in an example of a patient who was wondering why he was not involved in the decision-making of his care: “... I can make that judgment myself. Normally I play with a budget of a million; I really can manage to buy a bed...” [31].

The technology itself evoked feelings of uncertainty among the technology-dependent patients if they were not sure it worked. These feelings of uncertainty and fear of unexpected technical failure had a negative effect on patients' self-image, view of social acceptance, and establishing control over their own body. A quotation from a patient: “*The entire apparatus, the whole concept... just to put it on, - there's this feeling of claustrophobia.*” [24,28,31] Similarly, the studies of ITC services revealed that technology was “*not mature*”, and many patients and family caregivers complained about technical problems [25,33].

Discussion

Discussion of the results

Previous caring and nursing studies reveal that patients generally experience technology in care positively, as a necessity or a device making their life and caring easier or increasing their independence. The results of this study are similar with the Cox et al. [12], study reporting patient satisfaction with the use of technology. Technology as a necessity is related to the patient's experience of illness and its care. In those cases the experienced suffering is related to illness, life and the ability to sustain life, but on the other hand, technology is experienced to be a blessing. Technology as a device, which makes patients' life and caring easier or increases their independence, is experienced to be convenient and supportive. The inconvenience and suffering related to this kind of technology results from the immaturity of the technology.

It has been reported that health care professionals did not recognize the experimental knowledge of patients and did not permit its use in the decision-making in the context of technology in caring [20]. The results of this study support the view that patients' expectations and experiences of care are not always known, heard or taken into account. For example, the parents of technology-dependent children expressed the view that the utilization of their experimental knowledge could improve the individualized care of their child and help to adapt to the treatments based on the individual needs of their child. The parents felt that the health care professionals found it difficult to listen to them and take their expertise into account [24,29,30]. The dignity of the patient in care is the basic requisite of caring science [35]. This

basic requisite also applies to patients who require technology in their caring. Dignity in care means that the patient is respected and treated as a whole, unique and dignified person and his/her human rights, such as freedom and self-determination, are respected and realized in care when using technology. The patient's feelings of being heard, respected and treated as a whole is essential to the experience of caring or non-caring. When patients and their family members are not taken into account, it is an insult against their human dignity and autonomy. According to the findings of this study, this presents a challenge to health care personnel when developing and implementing good and ethical caring.

Patients want to live a life that is as normal as possible, and this is an important dimension of their health and wellbeing. If the use of technology in patient care results in the patient and other family members suffering from isolation, lack of social contacts and normal living environment, the technology is experienced as a burden, and the suffering in relation to caring increases.

As a result of technical forms of caring becoming more common, technical and caring support is needed to a greater extent than before. The safe and secure use of technology in care means that the care is well-planned and implemented without causing extra fear, pain, stress or feelings of non-caring to the patients and their families. Furthermore, it is not ethically acceptable that devices require much energy from patients and their family members who need to concentrate all their energy on coping with the illness and their everyday life. Using technology in care means that patients are in constant need of nursing, technical help and support. If these needs are denied to them, the experience of suffering increases due to the technology and lack of support [25,27,29].

Based on the patients' experiences, it is crucial that caring decisions are made in alliance with the patient. In addition, the patient should be provided with well-planned and individual education on the use of technology. Patients wish to get well-designed, easy-to-use, safe and effective technology which limits their normal life as little as possible. This poses a challenge to device designers, engineers, physicians, nurses and patients. Technology in patient care has many tasks and users, and all patients are unique and have different needs. This is why all user perspectives should be considered when developing technology for caring purposes and the theory of ethical caring in the context of technology.

According to the patients' experiences, truly caring and ethical care in the context of technology is realized when the caring personnel is competent, empathetic and supportive and treats patients with dignity, respecting the human rights and uniqueness of the patient. The illness and life situation of the patient is difficult, emphasizing the need for empathy and support.

This result is in line with the results of Bowling et al. [19]. Their study indicated that patients expected cleanliness, information and advice, a chance to discuss with health care personnel, and they wanted to be treated with respect and dignity. In patients' view, caring and nursing competence includes not only knowledge of technology, technological skills and critical thinking skills but also a holistic approach to patients and caring. Competency also includes that

caring personnel is trustworthy and prompt, this being an indication of appreciative behavior in human interaction.

The core of ethical caring is the dignity of a human being. From the perspective of patients, it is realized when they are heard and included in the decision-making concerning their caring and the use of technology. The precondition for ethical caring and the realization of human dignity is that patients are well-informed and educated so that they can decide to use the technology and live with technology and use it trustfully (Table 2). Life with illness and dependence on technology causes suffering and therefore patients and their families expect to get empathy, support and caring encountering from the health care professionals. Also by being prompt and trustworthy the caring personnel show their respect to patients. The patients also expect to be cared for as individuals in a unique way. If the patients' experiences and expectations of easy-to-use, safe and secure technology and caring are not considered, their dignity as human beings is not realized, thus increasing suffering. Patient-centered, ethical and good care can only be provided by competent caring personnel with a holistic approach to care and knowledge of their patients' experiences of technology and good caring.

Discussion of ethics and validity

The study material consisted of qualitative, published nursing and caring studies, thus making the study a secondary analysis. Choosing the secondary study strategy enabled a more comprehensive description of the phenomenon compared to a single study strategy [23]. Moreover, this strategy opened up the possibility of presenting a new study question to the existing material without disturbing the patients again, avoiding possible negative emotions as well as saving patients' limited energy [31,22]. Ring et al. [23], emphasized that when evaluating the validity of qualitative meta-synthesis, it is important to explicitly describe the synthesis, analysis and results. In this study the synthesis is described by tabulating the material, and the analysis of the material is done by searching for answers to the study questions. The answers to the study questions are presented in results as an interpretation from the perspective of caring science and thus the findings are placed in a larger context [22]. When evaluating the limitations of a literature review, we need to explore how precise and extensive the literature search strategy is and how selection bias of the material is prevented. To formulate an effective material search strategy, the search was performed with the support of information specialists focused on health sciences and systematic reviews. Based on discussions with two independent information specialists, the electronic databases Medline[®] and CINAHL were selected. Both experts considered these two databases to cover a wide range of material making the use of other databases futile. However, the databases and keywords chosen may have resulted in omission of some relevant literature. Because the concepts referring to technology are multiple, some relevant studies may have been excluded. The number of qualitative studies was eleven, which is regarded as sufficient in qualitative meta-synthesis [22]. Previous literature [1], has suggested that nursing and caring sciences have a relatively small amount of published qualitative studies related to patients' experiences of technology in caring. The material search of this study confirmed the impression.

Table 2: The preconditions for the realization of dignity and good care in the context of technology based on patients' experiences.

RESPECT OF HUMAN RIGHTS: to be heard to be taken into account informed consent decision-making patient education empathy encountering	PATIENTS' PRECONDITIONS FOR THE REALIZATION OF DIGNITY AND GOOD CARE IN THE CONTEXT OF TECHNOLOGY
SUPPORT: caring support technological support a spare device standby round-the-clock telephone support	
UNIQUENESS: appropriate care based on patients' needs and experiences	
TECHNOLOGY: easy to use safe flexible nice looking easy access testing of technology	
COMPETENCE: technological knowledge technological skills critical thinking skills holistic and caring approach trustworthy prompt timely	

During the entire study process, the guidelines of responsible conduct of research were followed. In particular, the authors' rights concerning the study material were taken into account by careful reference marking [36]. The connection between the interpretative explanation and patients' experiences in material were described by using quotations from the single studies results. This was done not only to fulfill the aim of the study to value and emphasize the patients' perspective and voice, but also to grasp the subtleties of the patients' experiences [22].

Conclusions

When studying the use of technology and its ethics as a good of human being and as an experience it can be seen that patients accept the use of technology in their care. Moreover, their experiences of its use are good if the technology is easy to use and safe. Technology must somehow benefit the patients, i.e., alleviate unpleasant symptoms or save time or trouble in their care. Successful use of technology requires that the patients have relevant information of its use and importance. From the perspective of patients, good caring is holistic and competent.

It is important to bear in mind that not all patients are willing to use technology. In case of not receiving enough information, having experiences of not being heard and not being involved in decision-making, results in negative emotions toward technology. These patients feel they are not respected and dignified as autonomous human beings.

When developing the theory of ethical caring in the context of

technology, it is crucial to know patients' expectations and experiences of the used technology and care. The basis for patient-centered and humane caring is to hear the patients and fulfill their expectations and needs. This is why more qualitative studies and knowledge of patients' experiences and needs in relation to technology in care is needed. In clinical practice it is important to create means and methods to ensure that patients' voice is heard and that they are encountered and taken into account. Qualitative single studies as well as qualitative meta-synthesis of patients' experiences present useful evidence on the subject matter.

It is important to know patients' experiences of their illness, life and care in the very beginning of the caring process, not forgetting these experiences throughout the entire caring process. According to patients' experiences the nurse's role is vital in the use of technology. The nurse gives the information and guidance that the patient needs. The nurse repeats and interprets the information and supports the patient and significant others, and also implements the demanding and often complex technological interventions in a competent manner. The results of this study increase knowledge and evidence on patients' experiences of dignity and suffering in relation to technology in caring. The acquired knowledge serves theory development by offering the content of the patients' experiences of dignity and suffering to further use.

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