

TURUN YLIOPISTON JULKAISUJA
ANNALES UNIVERSITATIS TURKUENSIS

SARJA - SER. D OSA - TOM. 1005

MEDICA - ODONTOLOGICA

**ADOPTION OF
INFORMATION TECHNOLOGY BASED
PATIENT EDUCATION
IN PSYCHIATRIC NURSING**

by

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TURUN YLIOPISTO
UNIVERSITY OF TURKU
Turku 2012

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ISBN 978-951-29-4920-5 (PRINT)

ISBN 978-951-29-4921-2 (PDF)

ISSN 0355-9483

Painosalama Oy – Turku, Finland 2012

*To Pasi, Jenny, Kalle
and
All my close ones*

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ABSTRACT

The overall goal of the study was to describe adoption of information technology (IT)-based patient education (PE) developed for patients and nurses use in psychiatric nursing. The data were collected in three phases during the period 2000-2006 in a variety of psychiatric settings in Finland. Firstly, the development process of IT-based PE for patients with schizophrenia spectrum psychosis was described. Secondly, nurses' adoption of IT-based PE and the variables explaining adoption were demonstrated. Moreover, use of daily IT-based PE in clinical practice and factors associated with use were identified and described. And thirdly, nurses' experiences of the IT-based PE after one year clinical use were evaluated.

IT-based PE program was developed in several stages based on users' needs and it included information and multimedia applications. Altogether, almost 500 IT-based PE sessions were carried out by the nurses on the study wards and revealed nurses' activity in educating patients using IT to vary and depend on the hospital in which they worked. Almost 80% of all the possible IT-based PE sessions involved 93 patients and 83 nurses. Less than 2% of the IT-based PE sessions were interrupted and less than 10% suffered disturbances due to the patients or external causes. Moreover, the patients whose education took more days had poorer mental status than those whose education was carried out over a shorter period. After a year's experience, advantages and disadvantages were described by the nurses for both patients and nurses of the IT-based PE. IT-based PE can be used even on closed acute psychiatric wards with patients with serious mental health disorders. However, technology adoption requires time, and therefore, it must fit in with clinical practice.

Collaboration between users and developers is needed when developing user-centered methods in the area of mental health services. Moreover, it is important to understand factors that affect IT adoption in healthcare settings. IT-based PE is one option in interactive and co-operative health care practice between patients and nurses. Therefore the staff should begin to refer patients to established, credible and well-maintained Internet sites that provide information on common psychological problems. Even if every nurse should be trained and engaged to carry out IT-based PE, by targeting the training especially for the most active nurses aids them to support the less active ones. Adoption should also be understood from a perspective that includes aspects related to the context where it is implemented and examine how and in what circumstances it works.

Keywords: information technology, patient education, adoption, psychiatric nursing, mental health services

Minna Anttila

TIETOTEKNIikkaAN POHJAUTUVAN POTILASOPETUKSEN KÄYTTÖÖNOTTO PSYKIATRISISSA HOITOTYÖSSÄ

Hoitotieteen laitos, Lääketieteellinen tiedekunta, Turun yliopisto, Suomi
Annales Universitatis Turkuensis
Turku 2012

TIIVISTELMÄ

Tutkimuksen tavoitteena on kuvata tietotekniikkaan pohjautuvan, potilaille ja hoitajille kehitetyn potilasopetuksen käyttöönottoa psykiatrisessa hoitotyössä. Tutkimusaineisto kerättiin psykiatrisen hoitotyön eri toimintaympäristöissä kolmessa vaiheessa vuosien 2000 ja 2006 välisenä aikana. Ensimmäiseksi kuvattiin skitsofreniaa sairastaville potilaille suunnatun ja tietotekniikkaan pohjautuvan potilasopetuksen kehittämisprosessi. Toiseksi havainnollistettiin hoitajien toteuttaman, tietotekniikkaan pohjautuvan potilasopetuksen käyttöönotto ja tutkittiin käyttöönottoon liittyviä tekijöitä. Lisäksi kuvattiin potilasopetuksen toteutumista päivittäisessä kliinisessä hoitotyössä ja tutkittiin potilasopetuksen toteutumiseen liittyviä tekijöitä. Kolmanneksi arvioitiin hoitajien kokemuksia tietotekniikkaan pohjautuvasta potilasopetuksesta vuoden käytön jälkeen.

Tietotekniikkaan pohjautuva potilasopetus kehitettiin vaiheittain vastaamaan käyttäjien tarpeita, ja se sisälsi tietoa ja tarjosi multimediatyökaluja. Lähes 500 potilasopetustapaamista toteutettiin osastoilla. Hoitajien aktiivisuus niiden toteuttamiseen vaihteli ja aktiivisuus erosi sairaaloittain. Lähes 80% suunnitelluista potilasopetustapaamisista toteutui: opetettavia potilaita oli 93 ja heitä opetti 83 hoitajaa. Alle 2% potilasopetustapaamisista keskeytyi, ja noin joka kymmenes häiriytyi potilaasta johtuvista tai ulkoisista syistä. Psykkisesti huonompikuntoisten potilaiden potilasopetustapaamiset kestivät useita päiviä. Vuoden käytökokemuksen jälkeen hoitajat kuvasivat tietotekniikkaan pohjautuvan potilasopetuksen sisältävän potilaiden ja hoitajien näkökulmasta sekä etuja että haittoja. Tietotekniikkaan pohjautuva potilasopetus on käyttökelpoinen menetelmä jopa suljetuilla akuuteilla psykiatrisilla osastoilla hoidettavien vakavasti sairaiden potilaiden kanssa. Tekniikan käyttöönotto vaatii kuitenkin aikaa ja mukautumista vallitsevaan kliniseen hoitokäytäntöön.

Käyttäjien ja kehittäjien välistä yhteistyötä tarvitaan, kun kehitetään käyttäjäystävällisiä menetelmiä mielenterveyspalveluihin. Se mahdollistaa vuorovaikutteisen yhteistyösuhteen potilaiden ja hoitajien välillä. Henkilökunnan onkin tulevaisuudessa ohjattava potilaita laadukkaille ja luotettaville Internet-sivustoille, jotka sisältävät tietoa yleisimmistä psykiatrisista sairauksista. Vaikka kaikilta hoitajilta edellytetään kouluttautumista ja sitoutumista tietotekniikkaan pohjautuvaan potilasopetukseen, on tärkeää, että koulutus kohdistetaan ensin kaikkein kyvykkäimpiin hoitajiin, jotta he voivat tukea toisia hoitajia. Lisäksi on tärkeä ymmärtää tekijöitä, jotka ovat yhteydessä käyttöönottoon, sekä kontekstia, jossa se on tarkoitus ottaa käyttöön.

Avainsanat: tietotekniikka, potilasopetus, käyttöönotto, psykiatrisen hoitotyö, mielenterveyspalvelut

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ABBREVIATIONS

CINAHL	Cumulative Index for Nursing and Allied Health Literature
CIOMS	Council for International Organizations of Medical Sciences
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision
ETENE	The National Advisory Board on Health Care Ethics
EU	European Union
GAF	The Global Assessment of Functioning
ICD-10	International Classification of Diseases, 10th Revision
ICT	Information and communication technology
IT	Information technology
JHS	Public Administration Recommendations
NICE	National Institute for Health and Clinical Excellence
OECD	Organization for Economic Co-operation and Development
OSF	Official Statistics of Finland
PE	Patient education
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
WCAG	Web Content Accessibility Guidelines
WHO	World Health Organization
WMA	World Medical Association Declaration of Helsinki

LIST OF ORIGINAL PUBLICATIONS

The dissertation is based on the following publications referred to in the text by the Roman numerals I-IV.

- I Välimäki M., Anttila M., Hätönen H., Koivunen M., Jakobsson T., Pitkänen A., Herrala J. & Kuosmanen L. 2008. Design and development process of patient-centered computer-based support system for patients with schizophrenia spectrum psychosis. *Informatics for Health & Social care* 33(2), 113-123.
- II Anttila M., Välimäki M., Koivunen M., Luukkaala T., Kaila M., Pitkänen A. & Kontio R. 2011. Adoption of an Internet-based patient education programme in psychiatric hospitals. *Journal of Psychiatric and Mental Health Nursing* 18, 914-923.
- III Anttila M., Välimäki M., Hätönen H., Luukkaala T. & Kaila M. 2012. Use of web-based patient education sessions on psychiatric wards. *International Journal of Medical Informatics*. In press.
- IV Anttila M., Koivunen M. & Välimäki M. 2008. Information technology-based standardized patient education in psychiatric inpatient care. *Journal of Advanced Nursing* 64(2), 147–156.

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1 INTRODUCTION

Mental health disorders are an international concern (European Commission 2005, WHO 2006, OECD 2008). More than 450 million people suffer from mental health disorders worldwide (WHO 2011a). Therefore, the social welfare and health care services are shifting to preventive action, in which the service system provides early and efficient assistance to people who can not cope themselves. Users can also be actively involved in the service system development, which increases their capacity to take responsibility for their own health and welfare. (Ministry of Social Affairs and Health 2010, 2011.)

Effective interventions and simple guidelines are needed (Jané-Llopis & Anderson 2006) which focus on the electronic provision of health and wellness information to all citizens (eHealth ERA 2007) including people with mental health disorders. Adequate and timely information about patients' illness is a key feature to addressing their individual needs (Kim & Chang 2007). Patients' willingness to follow through with their treatment plans are related to their perception and understanding of their illness (Perkins et al. 2000). Interventions concerning, for example, patient education (PE) involve interaction between the information provider and the mentally ill person, enable them to cope more effectively with their illness and have a positive effect on a patient's well-being (Xia et al. 2011). Information technology (IT) based PE could be employed to assist the co-operation of health care practice (Doupi & van der Lei 2005). This is essential in patients' changes to be informed (National Development Plan for Social and Health Care Services 2008) and promotes their competence on health literacy (eHealth ERA 2007).

While the importance of IT has increased in society, so also has its use in treatment (Fetter 2009). Patients and nursing staff use IT; they interact, communicate, find social and emotional support and health education, and use a variety of health services (Eysenbach et al. 2004). Nevertheless, in the area of mental health care, there is a lack of IT use across Europe (Jané-Llopis & Anderson 2006). Less systematic development of such methods can be found for patients with severe mental health disorders, such as schizophrenia (Jones et al. 2001, Walker 2006, Rotondi et al. 2007). Internet portals do not score high on readability (Kalk & Pothier 2008) and overall recommendations are too vague to provide adequate guidance in designing Internet sites and meeting these patients' specific needs (Rotondi et al. 2007). The quality of information is also a problem on the Internet sites (Eysenbach et al. 2002, Schrank et al. 2010). In interventions there has been variation in the format of personal contact with patients, in the structure or sequence of content, in the interaction involved and in evaluation of the intervention (Kirsch et al. 2004). Efforts to change professional practices have a lower likelihood of success unless these problems are identified and taken into account in the future development (Baker et al. 2010, Sanford & Oh 2010).

Challenges identified (Pallen & Timmins 2002, Baker et al. 2010) to the use of IT in clinical nursing practice are due to the nurses and structure of the health care services or patients. From the nurses' point of view, related factors are nurses' motivation (Janes et al. 2005, Veikkolainen & Hämäläinen 2006), stress (Mann & Cowburn 2005, Xianyu & Lambert 2006) and workload (Eley et al. 2009, Trivedi et al. 2009). IT programs developed for use in patients' care may fail because there is no peer support among staff to use them (Estabrooks et al. 2003b), the staff lacks time (Janes et al. 2005, Trivedi et al. 2009), there are no computers (Eley et al. 2009), Internet connections are poor (Drumm et al. 2003, Janes et al. 2005), the staff lack the appropriate IT skills (Janes et al. 2005) or they lack IT support (Eley et al. 2009, Trivedi et al. 2009). All kinds of problems with computers and their security, and a preference for more social interaction are also multiple challenges to greater IT use (Drumm et al. 2003, Janes et al. 2005). IT tools may have been located separately from treatment unit facilities and therefore PE may have been provided outside usual treatment (Wofford et al. 2005). Optimal timing of the intervention also raises questions (Feldman et al. 2002); nurses may not have enough information about PE interventions (Fernandez et al. 2006) or they may anticipate that IT will have negative consequences for patient care (May et al. 2001). Nurses may also have pessimistic attitudes towards mental health patients' functioning and outcomes of psychiatric illnesses (Ross & Goldner 2009) resulting in unbelief to develop services of these people.

From the patient's point of view, the reasons for not using the IT includes lack of access, difficulties or fears of using it, financial problems, preferences for other sources of information, and the expectations of Internet information being of low quality (Schrank et al. 2010). IT-based interventions may also appear as impersonal (Spek et al. 2006). According to Nijland et al. (2008) patients are usually not trained to use the self-care applications. IT systems are less often integrated into daily treatment programs (Wofford et al. 2005) to support patients, nor has PE been systematically carried out (Rummel-Kluge et al. 2006, Albada et al. 2007) in mental health care services. The reasons for the lack of action are related to lack of appropriate funding and opportunities for implementation (Jané-Llopis & Anderson 2006).

However, little is known so far about how IT-based PE has been developed for patients with severe mental health disorders, how nurses in psychiatry adopt technology, how IT-based PE has been used in clinical practice and what kind of experiences nurses have of IT-based PE. Therefore, it is important to obtain information about IT-based PE, make plans to adopt IT innovations in the field of mental health care services, and to support patients' self-management. User-centeredness and self-management among users has increased (National Academy of Sciences 2009) which can be supported using participatory design e.g. the people destined to use the service have a critical role in designing it (Schuler & Namioka 1993). It is one way to enhance users' opportunities to

adopt IT in the area of mental health care. Such information was sought in this doctoral process, which is part of the Mieli.Net program by Välimäki et al. (2008).

The Mieli.Net program was targeted for patients suffering from schizophrenia spectrum psychoses (ICD-10 codes F20-F29; WHO 2007). Patients willing to participate were randomised into one of the three PE groups: 1) a group in which the Mieli.Net IT program was used; 2) a group in which PE was carried out using written material without the IT program; 3) a treatment as usual group. The PE was carried out by nurses on the study wards. Nurses were also randomised into two groups. In the first group, nurses used the Mieli.Net IT program as part of PE. In the second group, nurses carried out PE using similar content in written form but without the IT program. This PhD study was conducted in the area of clinical nursing science. It focuses on the describing the development process of the IT-based PE, and its adoption and evaluation solely in the research group in which nurses and patients used IT. The aim of the study was not to make any comparisons between the study groups, but to describe the adoption of IT-based PE in psychiatric nursing. There are different studies measuring the outcomes between the different PE groups. The adoption process is studied from the perspective of the users in clinical practice setting and the results can be applied when developing IT-based PE and adopting it within psychiatric nursing.

2 LITERATURE REVIEW

2.1 Literature search

The purpose of this focused literature review is to provide understanding on the topic of mental health disorders and their care, PE, mental health care services and nursing staff, information society, and the development, adoption, use and evaluation of IT in psychiatric nursing. In the first main chapter, general information on the prevalence of mental health disorders, especially schizophrenia and its treatment, and the use of PE in mental health care is provided. The provision of mental health care services and the nursing staff especially in Finland is described. Moreover, information about IT use in general and PE using IT in the area of mental health care services are provided. In the second main chapter, the aims, quality issues and shortcomings in developing IT-based services especially in mental health care are described. In the third main chapter, information about adoption, characteristics and challenges influencing the use of IT in mental health care are illustrated. In the fourth main chapter, the evaluation frameworks and experiences of IT-based PE are described.

Multiple databases and Internet sites have been used for the literature search. More information about the search strategy is given in Appendix 1.

2.2 Mental health disorders and information society

2.2.1 Severe mental health disorders and their care

Nearly half a billion people suffer from mental health disorders (WHO 2011a), which can be compared to the estimate that there are 7 billion people in the world (Internet World Stats 2011). Anxiety and mood disorders are the most prevalent disorders and lifetime co-occurrence of two or more mental disorders is common (Maj 2009). In Finland, outpatient visits to mental health services increased from 1, 601, 442 to 2, 147, 808 between the years 1997 and 2009, and from 0.31 to 0.40 per inhabitant (National Institute for Health and Welfare 2010). Further, mental health disorders were the most common reason for participation in rehabilitation funded by The Social Insurance Institution of Finland in 2009, compared to the fact that for decades the largest group has been patients with musculoskeletal disorders (The Social Insurance Institution of Finland 2009).

Schizophrenia is among the most severe mental health disorders (Buchanan & Carpentier 2005), its prevalence being approximately 1% throughout the world (Schultz & Andreasen 1999). Patients with schizophrenia have defects in cognitive functioning (Moritz et al. 2006, Viertiö 2011) and they may suffer from loss of will or drive (Schultz

et al. 2007). Their treatment is challenging due to lack of treatment adherence (Kikkert et al. 2006), relapses (Haro et al. 2006), and lack of insight (Morrison et al. 2006). Their disorder is burdensome and due to this they suffer from loneliness (Chan & Yu 2004), lack close friends (Thornicroft et al. 2004) and may also be suicidal (Hunt et al. 2006). Almost half (46.3%) of the hospitalised patients with new schizophrenia diagnosis were treated involuntarily in Finland in 2001 (Karvonen et al. 2008). The treatment costs of schizophrenia are high (Bartels et al. 2003), many patients need recurring hospitalisations (Draman et al. 2005) and long-term (Schooler 2006), continuous medications with high costs (Chue et al. 2005). In Finland, the annual treatment cost of schizophrenia was estimated to be around 26, 588€ per patient in 2001 (Karvonen et al. 2008). More than half of the hospital treatment days (55%) in year 2009 were due to schizophrenia (Forsström & Pelanteri 2011).

The comprehensive treatment of patients with severe mental health disorders often comprises a combination of antipsychotic drugs and psychosocial treatment (Tandon et al. 2006, Schizophrenia Current Care 2008). Home treatment, day hospitals and inpatient hospital units are treatment options if symptoms get worse (NICE guideline 2009). Psychosocial interventions are for example cognitive behavioural therapy, family interventions, supported employment, vocational rehabilitation, assertive community treatment, and social skills training (Tenhula et al. 2009). Health education has most often been connected with interventions which target on a particular change in behaviour, being functional of preventing the onset or complications of a disease (Doupi 2005). In mental health care psychoeducation refers to training individuals in psychological knowledge and coping skills, and it is used to refer to programs that in other fields of nursing and treatment are called patient education (PE) (Redman 2001).

PE has been an effective way to increase patients' understanding of their mental health disorders (Turkington et al. 2002), to help them cope more effectively in their daily living (Pekkala & Merinder 2002), to reduce relapses, readmissions, the length of hospital stay, and to encourage medication adherence (Xia et al. 2011). PE is a central part of the work of all health professionals and if education is well designed and matches the learner's capabilities, it can be self-instructional (Redman 2001). Farren (2009) describes an educational interaction where individuals create knowledge in collaboration with each others and where dialogue is a fundamental part of the learning process. Learning is carried out in relation between individuals (Farren 2005) and learners need to become involved according to their own needs (Farren 2009). Moreover, IT can make possible highly individualised and self-paced learning (Redman 2001) and close interaction with each others (Farren 2005). IT-based PE solutions make information sources available for patients and nursing staff when or where the most needed (Doupi & van der Lei 2005).

According to the mental health care literature, the patients do not get enough information about the different treatment options (Gray et al. 2005), ways to manage in daily life (Thornicroft et al. 2004) or facts of their disorder (Burlingame et al. 2006). However, adequate and timely information about patients' illness is a key feature in addressing their individual needs (Kim & Chang 2007). It has a positive effect on a patient's well being and it promotes a better social functioning (Xia et al. 2011) and empowerment (Hackman et al. 2007). Further, patients' willingness to adhere with their treatment plans is related to their perception and understanding of their illness (Perkins et al. 2000). Patients are also encouraged to be active for getting extra support from their nurses (Bee et al. 2008) and have a right to be informed (Act on the Status and Rights of Patients 1992). PE may also be cost beneficial and useful for the nursing staff as a part of a treatment program (Xia et al. 2011). It is important that patients with severe mental health disorders do receive both planned care and education.

2.2.2 Mental health care services and nursing staff providing them

After the 1950's, mental health care services have undergone both administrative and structural changes in the Western world (Novella 2010) and also in Finland since the 1980's (Hyvönen 2008). The responsibility for organising mental health services has been transferred from central administration to the municipalities (Harjajärvi et al. 2006). According to the Finnish Mental Health Act (1116/1990), the Finnish municipalities organize the mental health services in their particular areas as part of public health care. The joint municipal boards for hospital districts organise mental health services regarded as specialised medical care and the services should be primarily organised on an outpatient basis. (Mental Health Act 1990.)

Inpatient mental health care services have been reduced with a simultaneous increase in outpatient services due to the deinstitutionalisation process and subsequent transformation (Hyvönen 2008). The average length of stay in inpatient mental health care has decreased from 49.2 to 34.0 days between the years 1997 and 2009, and housing services for people with mental disorders have increased from 1, 880 to 7, 160 days in the period 1995-2009 (National Institute for Health and Welfare 2010). The focus of social welfare and health care services is aiming at shifting to preventive action, in which the service system provides early and efficient assistance to people who want to increase their knowledge, be involved in their care or who cannot cope themselves (Ministry of Social Affairs and Health 2010, 2011). Mental health care services should be organised to support the patients' own initiative and require an effective system for the supervision of the services (Mental Health Act 1990). Health promotion involves actions that create living conditions and environments to support mental health and help people to adopt and maintain healthy lifestyles (WHO 2011b). In the future, services are planned to be

reformed so that the patients can be actively involved in the service development process and to increase their capacity to take responsibility for nurturing their own health and welfare (Ministry of Social Affairs and Health 2010, 2011).

In Finland, nursing staff who take responsibility for care and support patients with mental health disorders can be categorized into three different types of nurses. Registered nurses have a 3.5-year nursing education (Ministry of Education 2006), and practical nurses and mental health nurses (Ministry of Employment and Economy 2008) have a shorter (2.5 to 3 years) education in nursing. Most nurses are women, only 5% are men, and the number of male workers among practical nurses is 3%. The mean age among nurses is 41.8 years. (Ailasmaa 2009.) Together with the general transformation process in the service system, there have been changes also in the number of the nursing staff in Finland. According to National Institute for Health and Welfare (2009), the number of municipal nurses almost doubled (from 17, 190 to 34, 500) between 1990 and 2008, as has similarly changed the number of municipal practical nurses (from 19, 030 to 36, 480). During the same period of time, the number of municipal mental health nurses (e.g. practical mental nurses) has decreased from 4, 660 to 2, 620 (National Institute for Health and Welfare 2009) due to education and curriculum reform.

To regulate nurses' education and profession, certain laws have been introduced in Finland. The Statute on Continuing Vocational Education (1194/2003) was issued to support and maintain the professional skills and knowhow of the personnel, to support health care organizations' work, advancement and health care provision in sickness prevention and treatment (Statute on Continuing Vocational Education 2003). According to the Health Care Professionals Act (559/1994), health care professionals must maintain and improve their professional knowledge and skills required to carry on their professional activity and familiarise themselves with the provisions and regulations concerning these (Health Care Professionals Act 1994).

In Finland, the care of people with severe mental health disorders is primarily offered in an outpatient setting and provided by community mental health teams who may also have the opportunity to make home visits (Schizophrenia Current Care 2008). According to the Mental Health Act (1116/1990) a person can be committed to treatment against his or her will only if he or she is diagnosed as mentally ill, would become considerably worse or the illness would severely endanger his or her own or other people's safety, and if all other mental health care services are inapplicable or inadequate.

2.2.3 IT and PE in mental health care services

In March 2011, it was estimated that there were almost seven billion people in the world and of these over two billion use the Internet. The growth in Internet users has been

almost 500% between 2000 and 2011. (Internet World Stats 2011.) In Finland, more than 80% of the population are Internet users (OSF 2010, The World Economic Forum 2010) and Finland has risen among the three most successful countries in the world in adopting, integrating and implementing new technologies in its development and competitiveness strategies (The World Economic Forum 2011). Email, Internet banking and information seeking are the most common reasons for Internet use (OSF 2010).

The importance of IT in treatment specialities has also increased (Fetter 2009), as have the challenges to adopt IT in health care services. The reasons for this are political (European Communities 2007), financial (OECD 2005), economic (Stroetmann et al. 2006), societal (European Commission 2009) and equality (United Nations 2005). According to Muñoz (2010), empirically tested Internet services tailored to change individual behaviour and prevent health problems could reduce health inequalities worldwide. They may focus on IT-based health and wellness information for citizens and include general health portals (eHealth ERA 2007a). The portals can be used, for example: 1) when no other interventions are available, 2) while patients are on waiting lists, 3) during routine adjuvant treatment, 4) after treatment to prevent relapse, 5) for patients who cannot travel to clinics, 6) for patients who have a fear of stigma, 7) for those who do not speak the local language, and 8) to extend health care into prevention (Muñoz 2010). Internet material can offer a solution to the storage, access, easiness of reproduction, update and adaptation of content (Doupi & van der Lei 2005).

In Finland, the information society, which is barrier free, can be described with concepts such as accessibility, availability, usability, ease-of-use and design for all (Ministry of Transport and Communications 2011). So far, the access to information regardless of time or place has been well secured, and comprehensive national health care infrastructure and information networks have been developed. There are also Internet services which offer expert support for various patient groups, and health information portals for citizens. (Ministry of Social Affairs and Health 2007.) According to Rigby et al. (2011), Finland is an exceptional country with a planned and active national IT-based health and welfare program and provision of IT-based services for citizens. Citizens need reliable information about health promotion, the symptoms and treatment of illnesses, service providers, the content, availability, cost and quality of services, and their own benefits and rights. Interactive Internet services are also needed, such as consultation, question and answer columns, virtual discussion forums, and self-help systems for chronic illnesses. (Ministry of Social Affairs and Health 2007.) So far, the use of IT in health care services has been in continuous progress, and the nursing personnel have IT skills, IT applications and Internet connections at their disposal (Winblad et al. 2008).

On the other hand, in the area of mental health care services there is a lack of action to develop IT-based interventions across Europe (Jané-Llopis & Anderson 2006) even

if patients have shown interest in IT use (Crowley et al. 2006, Khazaal et al. 2008). Health information seeking is a popular activity on the Internet and a source for health information for those with mental health disabilities (Gallagher et al. 2008). IT-based PE has been found to be useful (Proudfoot et al. 2003) in improving patients' understanding and treatment of their illness (Lewis 2003, Walker 2006, Schrank et al. 2010), in helping them to cope with the illness (Proudfoot et al 2004, Thornicroft et al. 2004, Schrank et al. 2010) and in providing patients information they need due to the fear of stigma (Berger et al. 2005).

The reasons for lack of action are related to inadequate funding and opportunities for implementation, including insufficient information of what could be implemented, or lack of infrastructures supporting this task. Therefore, effective tools and simple guidelines are needed to support implementation and a move from interest into action. (Jané-Llopis & Anderson 2006.) The nursing staff also need informatics competence (Repique 2007) and a positive attitude towards IT (Estabrooks et al. 2003b). From the staff point of view, the use of technology is promoted when they perceive that it offers obvious benefits in their work (Emmelkamp 2005, Lapointe & Rivard 2006). In the future, IT has the potential to offer a possibility for consistent treatment across settings and populations (Rotondi et al. 2005), providing that the nursing staff also begins to utilize and integrate it into practice (Repique 2007). As its best, it provides rapid and flexible access to an important health information resource, and saves money and travelling time (Janes et al. 2005, European Communities 2006).

2.3 Development of IT-based services in mental health care

The development of services is supported by the emerging evidence that they improve patient outcomes (Coleman & Newton 2005). Therefore, user-centeredness and self-management among patients with health problems have increased (National Academy of Sciences 2009). Effective self-management support and links to patient-oriented services help to activate and inform patients and their families to better cope with the challenges of treating and living with the illness. The more effective self-management includes long-term support for patients and engagement of the whole care team (Wagner et al. 2001). Moreover, well-designed and appropriately employed IT can strongly support this goal (Hatzakis et al. 2006).

The aim that all users have opportunities to concentrate on the learning content and tools included in this, is supported in development of IT services, which are based on the users' needs. Thus users do not feel excluded and they maximise their own learning experience. (Mulhern 2009.) A common view of target areas is needed. These include understanding of the critical factors impeding services, application development,

understanding different users, contexts, the needs and requirements they set for the development, and joint development coordination, research into the critical factors and impacts of development (Hyppönen 2008).

To ensure overall user-centeredness, Internet sites need to be perceived by users as both usable and credible, which can be carried out with a small number of users who identify problems and assist in making improvements to them (Kinzie et al. 2002, Hinchliffe & Mummary 2008, Bae 2011). Mulhern (2009) has described as an example, how to develop an Internet site for people with mental health disorders. Internet site design and development included two main cycles: he first introduced users to the Internet site and elicited concerns around the areas of usability and accessibility. After conducting a questionnaire, he analysed the results in a focus group setting and later in individual interviews which were based around themes emerging from the focus groups. The second cycle dealt with an attempt to evaluate how well the Internet site met the needs of a health-oriented service. Therefore he held sessions with users and they looked more closely at some of the features built into the Internet site and from which the users gave feedback. (Mulhern 2009.)

User feedback throughout the developmental process is essential (Farrell et al. 2004, Fleischer et al. 2008), and to let the users to identify the most benefit from IT interventions and to be able to inform the developers to improve adherence (Nicholas et al. 2010). According to Kinzie et al. (2002) the users are in a unique position to provide early, authentic feedback because they know what they need and wish, and they can respond directly to the developers when they use the IT services themselves. The inclusion of users as evaluators is also critical for another reason: design experts are often experienced IT users and may easily overlook problems that more novice IT users will have. (Kinzie et al. 2002.) According to Kuosmanen et al. (2010) nurses were the most critical group when evaluating the usability of an Internet site intended for individuals with severe mental health problems.

When developing IT-based service, it is very important also to get the staff to understand why IT-based self-management services are needed, and what changes are required from the staff side, particularly in the care of the chronically ill, in order to exploit the potential of new services. Commitment to change can best be supported by participatory planning, in which the staff participate in the definition of the needs and solutions of new work processes and tools. (Valkeakari & Hyppönen 2009.) Therefore there are several Internet quality initiatives (Doupi 2005), protocols and guidelines to support development of IT services to its full potential (World Wide Web Consortium 2009). The purpose of the quality criteria for Internet services, for example, is to serve as a tool for developing and assessing Internet services, to improve their quality for both users and producers, and to increase their benefits. The criteria are grouped under assessment areas of use,

content, management, production and benefits. (Ministry of Finance 2008.) The Web Content Accessibility Guidelines cover a wide range of recommendations for making Internet site content more accessible to a wider range of people with disabilities. If these guidelines are followed, the Internet site content is more operable and understandable. (WCAG 2008.)

In general, the main emphasis of the protocols and guidelines is to provide good services designed especially for users in which particular care has been taken to ensure their usability (JHS Recommendations 2005), accessibility (JHS Recommendations 2005, Commission of the European Communities 2002), accuracy, completeness, readability and references (Eysenbach et al. 2002), transparency, honesty, authority, privacy, currency, and accountability (Commission of the European Communities 2002). One way to support the design and development process is to use a multimethod design that includes observation, a think-aloud process, survey and interview (Atack et al. 2008).

In patients' every-day life, it is important that services are easy to use (Rotondi et al. 2005), include clear, up-to-date information, consistent language and presentation (Mulhern 2009), are easy to understand and help patients to better understand their sickness (Sciamanna et al. 2004). They are expected to be navigable (Zeng et al. 2004, Nijland et al. 2008, Mulhern 2009), provide an alternative presentation of content in multiple forms (Zeng et al. 2004, Mulhern 2009) and to be illustrative (Enzenhofer et al. 2004). According to Yardley et al. (2010) and Nijland et al. (2008) patients often feel overwhelmed by the quantity of information. Patients also consider important that the Internet site should: 1) provide them with hope that they are not alone with their illness, 2) that they have the freedom to maximise their own learning experience when the information is arranged in smaller sections, and 3) that they feel that the use of the Internet site empowers them to make their own choices (Mulhern 2009). Therefore Internet sites should be designed to provide only essential information, but with options that access further information in a way that patients feel they have sufficient choices and control, and that they can quickly gain access to the specific information they seek (Yardley et al. 2010). Moreover, an option for regular and personal assistance (Spek et al. 2006, Nijland et al. 2008) and opportunities for interactive coping are highlighted in patients' responses (Bellack et al. 2005).

Despite the systematic development of IT-based interventions in mental health care services, less systematic development of such methods can be found for patients with schizophrenia (Jones et al. 2001, Walker 2006, Rotondi et al. 2007). In spite of the fact that IT-based interventions are able to recruit patients and maintain their participation (Jones et al. 2001, Bellack et al. 2005), the extent of dropout in IT-based treatment is also similar to that found in face-to-face treatments (Melville et al. 2010). The characteristics of an IT intervention which may play a role in treatment adherence include: (a) the

extent to which the intervention is believed to be better than alternative treatments; (b) the degree to which the intervention is compatible with the values, past experiences and needs of the individual; (c) how difficult the intervention is to understand and use; (d) whether the intervention can be experimented with prior to commencing treatment; and (e) whether the results of the intervention are visible to others (Melville et al. 2010).

Even easily accessed schizophrenia information Internet sites do not score highly for readability (Kalk & Pothier 2008). Overall recommendations are not enough specific to provide adequate guidance for designing Internet sites that meet the needs of these patients. Patients with schizophrenia may also experience problems in interpreting or understanding the organisation and conceptualisation of Internet site design and in locating the information they are seeking. (Rotondi et al. 2007.) Quality is also a problem on the Internet (Eysenbach et al. 2002, Schrank et al. 2010), and many health-related Internet sites lack scientific evidence and references (Griffiths et al. 2000, Gagliardi et al. 2002). Further, there is variation in the format of personal contact with participants, in the amount of interaction each participant has with the IT-based interventions and in the evaluation of IT-based processes (Kirsch et al. 2004).

2.4 Adoption and use of IT in mental health care services

The purpose of any new procedure adoption is to understand how behavioural change is brought about in a social system (Rogers 2003) and to assess the potential match between needs, resources and practice, and to make a decision to proceed or not (Fixsen et al. 2004). According to the literature search by Simpson (2002), motivational readiness and perceived needs are keys to innovation adoption, where an innovation can be defined according to Rogers' (2003) as an idea or a practice that seems new to an individual. Decisions to adopt new techniques or services can be made at either the individual or collective level. A collective decision is more complicated but necessary for comprehensive innovations, such as those for attaining general goals for action. At both levels, however, decisions are guided by the reception and utility of an innovation. (Simpson 2002.)

People seek innovations, evaluate them, find or fail to find meaning in them, complain about them, gain experience with them, modify and try to improve or redesign them (Greenhalgh et al. 2004). The adoption is influenced by the interaction among the innovation, the adopter, and the environment (Rogers 2003). Adoption is complex in nature and a decision to adopt is rarely independent of other decisions, and is rather a process than a single event (Greenhalgh et al. 2004). Everett Rogers' (2003) innovation diffusion model as an example, describes the process in which the utilization of innovation diffuses among people. Individuals go through a mental innovation decision

process when they are faced with an innovation. This process includes stages from (1) knowledge of the innovation to (2) forming an attitude toward it to (3) making a decision to adopt or reject it to (4) implementation of the new idea and (5) to confirmation of this decision. Further, there are four innovation characteristics that affect the diffusion: relative advantage, complexity, trialability and observability. (Rogers 2003.)

According to Rogers' model (2003), individuals can be classified according to the time used in their uptake of the innovation and population can be classified into laggards (16% of a population), late majority (34%), early majority (34%), early adopters (13.5%), and innovators (2.5%). The way in which new ideas are spread and adopted after their introduction has been described follow the pattern of an s-curve familiar from epidemiology of e.g. infections, with an initial slow period of acceptance led by early adopters. This is followed by a period of accelerated acceptance as the concepts diffuse through the environment. Finally, acceleration drops off as the late adopters and laggards follow. The rate of adoption is generally measured in terms of the number of individuals who adopt a new idea within a specified period and the rate of adoption is indicated by the steepness of the diffusion curve. (Rogers 2003.)

Rogers' model (2003) has been used in research in various disciplines such as nursing (Pallen & Timmins 2002, Estabrooks et al. 2003a, Milner et al. 2005, Oppewal et al. 2006), education (Gomes & Murphy 2003, Sahin & Thompson 2006), business (Cheng et al. 2004) and management (Wonglimpiyarat & Yuberk 2005). Further, it has been used in IT studies (Karahanna et al. 1999, Ortega Egea et al. 2007).

Various factors associated with IT use have been identified, such as usability, complexity, relative advantage (Fuller et al. 2007), positive expectations and their confirmation (Mead et al. 2003, Palm et al. 2010), accessibility, computer expertise, attitudes toward its use (Sahin & Thompson 2006), and other people's functioning (Frambach & Schillewaert 2002, Gosling et al. 2003). Moreover the predictors for patients obtaining health information from the Internet include positive attitude towards obtaining health information from alternative sources and social deprivation (Mead et al. 2003). Nursing staff may also see the usefulness of the technology on the job. They need to perceive that people important to them in their jobs think that they should use the technology and that it involves a better image in the organization. (Zhang et al. 2010.) From the perspective of organization leaders, the visible support and promotion is a major predictor of success. Guidelines become effective only, when they are assimilated into patient care and have been delivered through the coordinated actions of the staff. Patients' positive responses encourage continuation of these efforts, especially when there is leadership support and no turnover in it. (Wagner et al. 2001.)

However, a small proportion of technologies are adopted into daily practice of patient care (Grol 2005) and a number of challenges have been identified when technology has been adopted in practice (Pallen & Timmins 2002, Baker et al. 2010). These are due to nurses, patients, or the structure of the health care services. From the nurses' point of view, related factors are nurses' lack of energy or motivation to learn new skills (Janes et al. 2005, Veikkolainen & Hämäläinen 2006), to use IT in daily care (Estabrooks et al. 2003b) or the stress of the staff (Mann & Cowburn 2005, Xianyu & Lambert 2006). IT programs developed for use in patients' care fail because there is no caring or supportive staff to help in using them (Estabrooks et al. 2003b), or because of fear of losing authority in the face of health literate patients (eHealth ERA 2007). Various IT tools may have been located separately from the treatment unit facilities even though they are integrated into treatment protocols, IT-based PE may have been provided during separate office visits or by using home-based computers (Wofford et al. 2005). Further, nurses may not have been provided with sufficient evidence about educational interventions for their work (Fernandez et al. 2006). The nurses may also anticipate that IT will replace face-to-face contacts with patients and have negative consequences for patient care (May et al. 2001), even though no extra problems with recovery have been observed when using IT in rehabilitation (da Costa & de Carvalho 2004). A discussion is also raised about optimal timing of the intervention (Feldman et al. 2002) or what is an appropriate intervention (Fernandez et al. 2006). Nurses' pessimistic attitudes towards mental health patients have been associated with patients' poor functioning, outcomes, benefits, treatment approaches (Ross & Goldner 2009) and negotiating capabilities about care plans in acute inpatient mental health care (Ahmead et al. 2010).

Moreover, the staff lacks time (Janes et al. 2005, Veikkolainen & Hämäläinen 2006, Trivedi et al. 2009), have heavy workloads (Eley et al. 2009, Trivedi et al. 2009), have no IT skills (Janes et al. 2005) or lack expert support (Veikkolainen & Hämäläinen 2006, Eley et al. 2009, Trivedi et al. 2009). No access to computers (Eley et al. 2009), poor availability of broadband Internet access, problems with computer hardware and networks, concerns about database security, difficulty in finding quality information, and a preference for learning modalities which include more social interaction are also multiple challenges to greater Internet use among nurses (Drumm et al. 2003, Janes et al. 2005). Efforts to change professional practice have a lower likelihood of success unless these challenges are identified and taken into account (Baker et al. 2010, Sanford & Oh 2010).

From the patient's point of view, IT-based interventions may appear impersonal (Spek et al. 2006). The general reasons against using the Internet to find illness-related information were lack of access to a computer and difficulties using technology (Mead et al. 2003, Schrank et al. 2010). According to Schrank et al. (2010), financial problems, fear of computer viruses, fear of Internet addiction, preference for other sources of information,

and the expectation of low quality of Internet information pose a challenge to use IT. Further reasons were that the demand for information had already been satisfied, lack of interest, and the wish to rely on a doctor. (Schrank et al. 2010.) According to Nijland et al. (2008) patients are not trained to use the self-care services and they have no idea whether using the interventions would continue to be free of charge in the future. The structure of the Internet sites may also seem so unclear that all kinds of features to document and upload information are overlooked. (Nijland et al. 2008.)

In Finland, from the perspective of the health care services, there are some weaknesses even if there is a comprehensive basic IT infrastructure in health care. The weaknesses are largely due to the decentralised decision-making and cooperation between health care service providers and difficulties in integrating local IT services as there is no clear steering system for IT management in the health care sector. It has been difficult to undertake development and to achieve the nationally defined targets. Other weaknesses include that the viewpoint of the individual citizen has been of secondary importance and development trends at the European level are under-resourced and inadequately organised. (Ministry of Social Affairs and Health 2007.) Further, there has been a scarcity of funds for training and difficulty in finding substitutes for the training time. The planning of training courses and the assessment of the quality of training has also posed challenges. (Veikkolainen & Hämäläinen 2006.) There are also experiences of no opportunities to participate in IT service development (Viitanen et al. 2011).

Worldwide, competing health service priorities (WHO 2011b) and the complexity of integration with existing hospital IT services (Colpaert et al. 2010) has consistently been rated as the greatest challenge to IT adoption. Health care services are under increasing pressure to face multiple health challenges and chronic staff shortages, all of which make intervention choosing difficult and require evaluation (WHO 2011b). Other major challenges to adopting specialized IT services are concerns about IT costs (Drumm et al. 2003, Janes et al. 2005), limited budgets (WHO 2011b), the high initial costs and maintenance costs, and the unclear return on investment (Colpaert et al. 2010). Nevertheless, IT services are less often integrated into daily treatment (Wofford et al. 2005) to support patients. Nor has IT-based PE been systematically carried out (Rummel-Kluge et al. 2006, Albada et al. 2007) even though the need for adoption of patient support and education programs has been raised in discussions since the Green Paper (European Commission 2005).

2.5 Evaluation of IT-based PE use in mental health care services

There are both a guideline (Nykänen et al. 2011) and different frameworks to evaluate IT interventions development and use in health care services. The frameworks differ in

terms of generality and specificity, and in theoretical background (Yosof et al. 2008). It is important that the programs and IT evaluation take place both during and after the development of services (Currie 2005). According to the definition by Crutzen et al. (2009), user experience includes the total time span of a visit to an Internet-based intervention and refers to how a person acts and what a person thinks and feels during and after a visit. Positive user experience during and after the first visit is a prerequisite to revisit an Internet-based intervention and to visit long enough to complete it. (Crutzen et al. 2009.)

According to Bellack et al. (2005) results from observations of patients with schizophrenia during a computer-assisted cognitive program suggested that patients were generally able to understand and implement the cognitive strategies and techniques that were emphasized in this program. Patients have also enjoyed the challenging nature of their learning experience and valued the implications of their capability to learn new skills (Koblik et al. 2009).

On the other hand, some patients have also described fear or anxiety as being a major obstacle in their learning experience. A sense of confidence emerged over time when they started to tolerate fear and achieved their goals. (Koblik et al. 2009.) According to Nicholas et al. (2010) study, weekly PE for certain patients about their disorder was experienced as confronting and this did not relate to the intervention's information and practical advice. The information has also been regarded as too basic or simplistic and therefore already known for patients. Further, patients may be dissatisfied because they expect IT-based PE or feedback to be personally tailored. They may have worked through the intervention but did not complete the associated tasks. (Nicholas et al. 2010)

Evaluation can also be carried out (Crutzen et al. 2009) by assessing different aspects of exposure such as: 1) access to the intervention Internet site, i.e. the first visit, 2) stay on it long enough to use and process the information and 3) revisit the intervention Internet site (see also Verheijden et al. 2007). However, with regard to staying long enough, it is hard to indicate a desirable length of time which differs per intervention and depends on the time which an individual needs to process the PE provided. There may also be differences in the time needed between individuals. (Crutzen et al. 2009.) Evaluation can also be measured as time spent thinking about the information, talking about it, recalling the different sections of the intervention materials, and seeking additional information from the Internet. To assess intervention exposure, frequency and duration of use of the materials can be assessed via self-report over a certain time in which people are asked to record the start and end times that they viewed the intervention. (Marks et al. 2006).

2.6 Summary of the literature review

The importance of IT in treatment services is increasing (Fetter 2009) and so have the chances to adopt it in health care services. However, a number of challenges and even barriers have been identified when technology has been adopted in practices (Pallen & Timmins 2002, Baker et al. 2010). These challenges are due to nurses, patients or the structure of the health care services or, as Gotham (2006) classifies them, individual, organizational and external levels. Therefore, effective interventions, simple guidelines (Jané-Llopis & Anderson 2006) and target areas defined (Hyppönen 2008) in co-operation (Mulhern 2009) with different users in mental health care services are needed.

Factors according to the literature review are listed in Figure 1. These are the factors to be considered when an IT-based PE is being developed in psychiatric nursing, and when its adoption and use is studied and this process evaluated in practice.

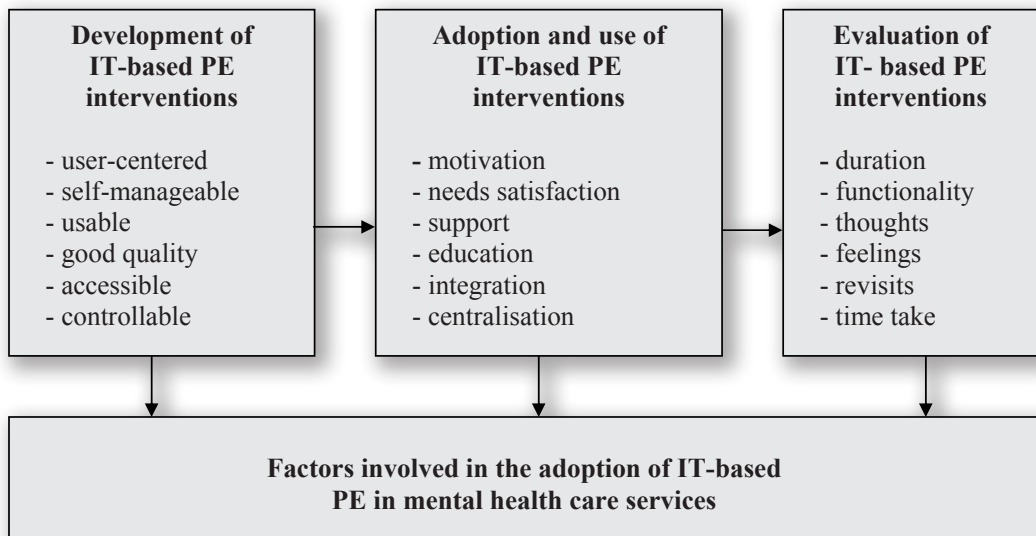


Figure 1. Factors involved in the adoption of IT in mental health care services

3 AIMS OF THE STUDY

Adoption of IT-based PE developed for the use of patients and nurses in psychiatric nursing was done in a retrospective way by evaluating project performance and describing different phases (development, adoption and use, evaluation) and critical milestones in a life cycle of an IT-based PE (Nelson 2009). The study adopted the following aims and more detailed research questions were addressed:

PHASE I:

To describe the development process of an user-friendly IT-based PE for patients with schizophrenia spectrum psychosis (Paper I)

PHASE II:

To demonstrate nurses' adoption of an IT-based PE in two psychiatric hospitals and the variables explaining the success in adoption (Paper II)

1. What is the distribution of IT-based PE and nurses offering it on the study wards?
2. How can nurses be classified into different adoption categories?
3. Are there any differences between nurses' background variables and nurses' level of adoption with IT-based PE?

To describe the daily use of IT-based PE in clinical practice and to identify factors associated with use (Paper III)

1. How is IT-based PE carried out on the study wards?
2. How do nurses describe the practice of IT-based PE?
3. How are the duration, number and success of IT-based PE associated with patients' background characteristics and use of IT-based PE?

PHASE III:

To evaluate nurses' experiences of the IT-based PE in clinical practice after one year's use (Paper IV)

1. What kind of advantages did nurses experience with the IT-based PE?
2. What kind of disadvantages did nurses experience with the IT-based PE?

SUMMARY:

To describe the adoption of IT-based PE developed for the use of patients and nurses in psychiatric nursing (Papers I-IV)

4 METHODOLOGY

4.1 The focus of the doctoral study

The type of PE and Internet sites that include health education and skills to better manage mental illness are the focus of this doctoral study. IT-based PE was taken to comprise an Internet portal and it mainly included plain information on Internet sites, not communication with each others. Therefore IT instead of ICT was the concept used and the focus of this study. IT-based PE was tailored to cover information important to patients, include health information about schizophrenia and related psychoses and to meet these patients' individual needs. Patients had IT-based PE during their treatment period on the ward and it consisted of several stages; an introductory session at the beginning and then education sessions. A patient and a nurse interacted with each other and went through the information related to patients' disorder and coping with it. After that the patients had a change to use the portal independently at home. Rogers' model (2003) was chosen to be a framework to illustrate nurses' adoption because the model focuses on individuals and in IT-based PE, individual nurses educated individual patients on the wards based on individualised patient care.

4.2 Methodological approach

In this study, adoption of IT-based PE was studied using triangulation e.g. qualitative and quantitative methods were used simultaneously (Nieswiadomy 2010) and a more detailed mixed methods approach was used to gain a wide range of information from the subject studied. A mixed methods approach (Long & Boswell 2007) is a combination of qualitative and quantitative methods in which the strengths of both are used to reveal different aspects and to draw together a wide and profound understanding of the research subject. The conclusions of the study were made according to three phases of the study and the reliability of the results was strengthened when complementary insights arose which might have been missed if only one research methodology had been employed. (Long & Boswell 2007.) This kind of research may be undertaken when an issue with minimal earlier research has been identified, when there are serious gaps in the existing research or in many complicated nursing interventions and when a more comprehensive understanding of the topic studied is needed (Polit et al. 2001).

4.3 Design and settings

In **Phase I**, a descriptive design was used to describe the development process of IT-based PE. During an earlier development process, a participatory design was used

to represent an approach to computer service design in which the people destined to use the service have a critical role in designing it (Schuler & Namioka 1993). User participation increases the potential to reflect the users' needs and to increase the potentials of the services to be used according to their intentions (Bødker et al. 2004). Participatory design is a way to increase the likelihood of more staff participation, to offer concrete suggestions for designing services that fit the working environment, to foster communication within the organisation and to reflect the needs of the staff working there (Bravo 1993). This research paradigm is useful in certain types of studies when there is a need to illustrate in-depth information on an issue with few earlier studies (Carter 2000, Polit et al. 2001, Wood & Ross-Kerr 2006). To achieve a broad and profound understanding of the basis of the development process, the data were explored using several sources and several types of methods and this phase included various stages, such as user needs analysis, information area development, prototype development and user evaluation. (Paper I.)

The data was collected in multiple settings during the development process, to access a wide range of information as the basis of the development process. Depending on the study stage both cross-sectional surveys and focused literature reviews were used as sources of information. There were also other researchers (Koivunen et al. 2007, 2008a, Kuosmanen et al. 2006, 2010) doing their own research and involving in the development process of the IT-based PE. In the first stage, Finnish psychiatric hospital organisations, three wards of one psychiatric hospital and two wards in another psychiatric hospital formed the data collection settings. (user needs analysis). Second, one psychiatric hospital and a patient association formed the data collection settings. (information area development). Third, the prototype of the information site was developed at the Tampere University of Technology because expert information was needed. (prototype development). Fourth, the evaluation of the prototype site was conducted in two psychiatric hospitals. (user evaluation). (Paper I.)

In **Phase II**, a demonstrative perspective and cross-sectional quantitative design (Polit et al. 2001) was used to describe nurses' adoption of an IT-based PE. The adoption was studied from the perspective of the nurses. The aim was to count and classify the adoption and to describe the variables explaining adoption. (Paper II.)

Further, a descriptive and evaluative design (Bond 2000, Polit et al. 2001) was used to describe the daily use of IT-based PE in clinical practice and to identify and describe associated factors. A combination of qualitative and quantitative cross-sectional data analysis approach was used to describe and to provide complementary information about IT-based PE use and the extent to which the program met the goals and needs of the users (Bond 2000). All the experiences, including patients, were described by the nurses. (Paper III.)

In **Phase III**, a descriptive and phenomenological qualitative design was used to evaluate nurses' experiences and illustrate the implication (Polit et al. 2001, Nieswiadomy 2010) of the IT-based PE in clinical practice after one year's use. An evaluation focused on nurses' experiences of IT-based PE and in which they also described patients' experiences of it. Therefore, user-centricity refers to the extent to which the evaluation considers the users' perspective (Currie 2005). The data were studied by means of a cross-sectional survey. (Paper IV.)

In **Phases II-III**, the study was conducted on nine closed acute hospital wards in two psychiatric hospitals in southern Finland (Hospital District of Helsinki and Uusimaa, Kellokoski Hospital and Pirkanmaa Hospital District, Pitkänieni Hospital). In general, the treatment periods were relatively short and patients treated on those wards needed acute care and were treated either voluntarily or involuntarily. (Papers II-IV.)

Different phases and aims of the study are summarized in Figure 2.

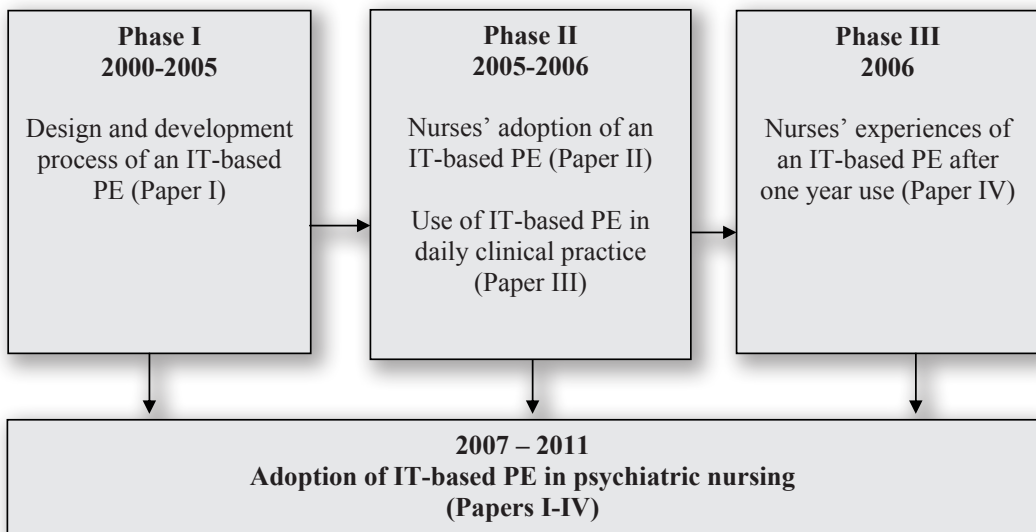


Figure 2. Different phases, aims and summary of the study

4.4 Study subjects and sampling

In **Phase I**, multiple study subjects and sampling methods were used to describe the development process of IT-based PE. In the first stage, while the program was under development, study subjects formed of 1) all the hospital administrators in psychiatric hospitals, 2) all patients discharged from three wards of one psychiatric hospital able to read Finnish, over 18 years of age, competent to give informed consent, 3) competent adult patients discharged from two wards of one psychiatric hospital and 4) voluntary

relatives of discharged patients from two psychiatric wards. (user needs analysis). In the second stage, a multidisciplinary team in a psychiatric hospital and patients in a patient association were the study subjects. (information area development). In the third stage, the study subjects were formed of patients in two patient associations, nursing students at one university of applied sciences and nurses in one psychiatric hospital and of expert group in the field of technology. (prototype development). In the fourth stage, nurses in two psychiatric hospitals were the study subjects. (user evaluation). (Paper I.)

In the first stage, while the program was under development, a nationwide total sampling was targeted at all hospital administrators in psychiatric hospitals to obtain as much information as possible, convenience sampling for all available patients discharged from psychiatric hospitals (Wood & Ross-Kerr 2006) and purposive e.g. judgemental sampling to handpick (Niewiadomy 2010) relatives of discharged patients willing to participate. (user needs analysis). In the second stage, purposive sampling was targeted at a multidisciplinary team and patients in a patient association. (information area development). In the third stage, purposive sampling was used for an expert group in the field of technology (Nieswiadomy 2010), patients in patient associations, nursing students and nurses in a psychiatric hospital. (prototype development). In the fourth stage, purposive sampling was used to handpick representative nurses in two psychiatric hospitals. (user evaluation) (Paper I.)

In **Phase II**, the nurse population consisted of all the nurses working for at least some time on nine study wards in two psychiatric hospitals and randomised (Polit et al. 2001, Wood & Ross-Kerr 2006) into the group to use IT as part of PE. Exclusion criteria included being ward managers, contact nurses for the study and nurses working night shift only. Total sampling of all the nurses required to educate or educating patients using IT was used. (Paper II.)

Further, the patient population was studied using nurses' descriptions and consisted of all patients who were hospitalised on nine psychiatric wards in two psychiatric hospitals suffering from schizophrenia spectrum psychoses (ICD-10 codes F20-F29; WHO 2007), aged between 18 and 65 years, able to understand Finnish, competent to give informed consent, willing to participate and randomised into the IT-based PE group. The nurse population was composed of the nurses (see Paper II) who educated patients using IT on the study wards. Total sampling was used for all the patients who were supposed to receive IT-based PE so as to gather as much information as possible. For the nurses, purposive sampling (Nieswiadomy 2010) was used for those who educated patients using IT and were experts concerning the IT-based PE. (Paper III.)

In **Phase III**, out of the three PE groups: 1) the Mieli.Net IT program use; 2) PE carried out using written material without the IT program; 3) a treatment as usual group, the

study subjects comprised the nurses who were randomised to the IT-based PE group or were in charge of the study on the nine study wards (ward managers or contact nurses for the study). Purposive sampling methods (Nieswiadomy 2010) were used to obtain expert knowledge from the nurses with experience of the study subject. (Paper IV.)

4.5 Questionnaires and interviewing methods

Different questionnaires and interviewing methods were used in the study to describe various viewpoints in the adoption of IT-based PE. The selection of these methods is based on the aims and more detailed research questions.

In **Phase I**, the description of the development process of IT-based PE was formed of several questionnaires and interviews. Previously while the program was being developed, a self-report questionnaire was used for health care administrators to ascertain the needs for PE. A self-report patient satisfaction questionnaire was used with patients discharged from three acute wards, a semi-structured questionnaire with patients discharged from two psychiatric wards and interviews with themes with their relatives. (user needs analysis). Focus group interviews were conducted with the multidisciplinary team to allow multiple perspectives and to minimize profession-specific biases. Interviews are one of the most commonly used techniques in IT design (Bødker et al. 2004). Moreover, both a structured and an open-ended interview schedule (Polit et al. 2001) were used for patients' feedback on the portal. (information area development). Focus group interviews were also used for expert groups to prepare the prototype content and its structure as suitable as possible for the target group. Closed-ended self-report questionnaires were used with patients in a patient association, nursing students and nurses. (prototype development). An open-ended self-report questionnaire was also used with the nurses. This questionnaire focused on the quality of Internet services and the nurses' gave their written opinions about the functionality, content and benefits of the IT-based PE. (user evaluation). (Paper I.)

In **Phase II**, self-administrated report questionnaires developed for the study were used to demonstrate nurses' adoption of IT-based PE. These included information about the date of the IT-based PE session and the name of the nurse. Nurse demographics were measured using a self-reported semi-structured questionnaire. It included factual questions (Wood & Ross-Kerr 2006) about age, gender and basic education of the nurses (registered nurses or mental health/ practical nurses). Likert-type items (Polit et al. 2001) also included attitude questions about nurses' perceptions of their computer and Internet use (daily/ weekly/ monthly/ less often/ not at all), computer and Internet skills (1 = very good to 5 = very poor), and attitudes towards computer and Internet use (1 = very positive to 5 = very negative); attitudes in relation to the beliefs that they

held (Edelman 2000) about computers and Internet and the actions taken towards these. (Paper II.)

The same self-administrated report questionnaire was used to describe the use of IT-based PE. In addition to the date of the IT-based PE session carried out and the name of the nurse, it included information about the specific events such as topic, and starting and ending times of the IT-based PE sessions. There was also an observational category scheme in which nurses were able to make systematic notes (Pontin 2000b, Polit et al. 2001) about the sessions, such as interruptions and causes of these (patient/nurse), disturbances, and the patients' ability of concentrating (good/ poor). There were also open-ended questions for nurses to make field notes and to describe what patients had discussed regarding their experiences of the IT-based PE (Pontin 2000b). Participatory observation is a useful technique for gaining direct experience with a proposed new intervention and it makes possible to study how specific tasks are performed in practice and were used under actual conditions (Bødker et al. 2004). (Paper III.)

Patient factors were described using a self-reported questionnaire. The questionnaire included dichotomous questions (Polit et al. 2001) about the patients having a computer and Internet connection at home (yes/ no) and the hospital they were treated (A/ B). The same 5-item Likert scale as with nurses was used to elicit patients' computer and Internet use, computer and Internet skills, and attitudes towards computer and Internet use. A semi-structured questionnaire was used to measure patients' age, gender, education, diagnosis, number of previous hospitalisations and age at onset of mental illness. The patients' overall functioning was measured by the nurses using a structured questionnaire comprising ten behavioural descriptive categories ranging from 1-10 (persistent danger, or persistent inability, or serious suicidal act) to 91-100 (superior functioning, life's problems never get out of hand, is sought out by other, no symptoms) (The Global Assessment of Functioning, GAF; DSM-IV-TR 2000). The GAF has been widely used (Aas 2011) in clinical practice. (Paper III.)

In **Phase III**, a self-report questionnaire with open-ended themes was used to evaluate nurses' experiences of the IT-based PE after one year's use in clinical practice. The nurses were asked to write descriptions (Pontin 2000a) of their experiences of the IT-based PE in terms of: (1) the use in their own work; (2) the content supporting psychiatric nursing; (3) usefulness for themselves; and (4) usefulness for patients. A semi-structured questionnaire included information about age, gender and basic education of the nurse as in Paper II. (Paper IV.)

4.6 Data collection and participants

In **Phase I**, a variety of data collections and participants was used in several stages during the development process of IT-based PE. (Table 1.)

In the first stage (years 2000-01), data was collected using questionnaires from the health administrators, from patients discharged from three acute wards, from discharged patients on two acute psychiatric wards and using interviews with their relatives. In the first stage, the data was further collected from the existing literature. (user needs analysis). In the second stage, data was collected with focused literature searches, from the multidisciplinary team using interviews, and by using a series of group interviews and collecting systematic feedback from patients in a patient association. (information area development). In the third stage, data was collected by using a questionnaire from patients in two patient associations and from nursing students and nurses, from expert groups using interviews and by focused literature searches. (prototype development). In the fourth stage, data was collected from nurses in two psychiatric hospitals using questionnaires which were completed three weeks after they participated in IT-based PE training. (user evaluation). (Paper I.)

Table 1. Participants in different stages in Phase I

Stages	Participants
1. User needs analysis	<ul style="list-style-type: none"> - Hospital administrators within psychiatric hospitals (N= 55, n = 36 hospital organizations (58 different wards) - Discharged psychiatric hospital patients (N = 597, n = 313) - Discharged psychiatric hospital patients (n = 51) - Relatives of discharged psychiatric hospital patients (n = 50) - Literature search (national and international research articles, web-pages)
2. Information area development	<ul style="list-style-type: none"> - Literature search (ICD-10 classification, relevant textbooks, scientific articles, valid national care recommendations) - Multidisciplinary team (interviews n = 10 with nursing directors, psychiatrists, nursing teachers, mental health nurses, researchers, experts in the field of technology) - Patients in a patient association (all the volunteers)
3. Prototype development	<ul style="list-style-type: none"> - Expert group (interviews n = 10 with mental health care experts, users, experts in the field of technology) - Literature overview (existing computer-based support systems) - Patients in two patient associations (n = 21) - Nursing students at an university of applied sciences (n = 20) - Nurses in a psychiatric hospital (n = 35)
4. User evaluation	<ul style="list-style-type: none"> - Nurses in psychiatric hospitals (N = 76, n = 38)

In **Phase II**, the data on nurses' professional backgrounds were collected using questionnaires in 2004 or when a new nurse joined the study. Participant data was formed from all the 100 nurses who educated or had a possibility to educate patients using IT. It was collected between in 2005-06 by using report questionnaires from nurses on the nine study wards to demonstrate their adoption of an IT-based PE. The nurses were informed about the study by the researchers before it started and offered computer and Internet training organised by the study hospitals. The report questionnaires were distributed to the study wards by the research assistants and collected after the patient's IT-based PE has finished (one introductory and five education sessions). (Paper II.)

Patient data was collected on the study wards between in 2005-06. The research assistants assessed patients' eligibility for the study, informed the patients about it, evaluated their capability, elicited their willingness to participate and requested written consent. Patients willing to participate were randomised to one of the three PE groups, 1) the Mieli.Net IT program use; 2) PE carried out using written material only; 3) a treatment as usual group. For this study, data was collected solely from the group in which IT-based PE was carried out. Nurses responsible for IT-based PE completed report questionnaires in paper after each PE session. Data was also collected from patients who completed background questionnaires which a research assistant distributed to them. Patients completed these independently and the research assistant was available if the patients needed any help. Some of the patient background data was collected from questionnaires which nurses completed by referring to the patient records and which they were trained to fulfill by research assistants. Participant data was from 93 patients who received IT-based PE and supplied by 83 nurses who educated patients using IT. (Paper III.)

In **Phase III**, data collection was carried out using a questionnaire. All study wards had research contact persons who were responsible for informing the nurses about the study and data collection process. The researcher organised information sessions for the contact persons and gave them oral and written information about the study and material to be distributed to the nurses. The questionnaire was accompanied by a cover letter which gave information about the purpose of the study, assurances of anonymity and confidentiality. The response time was within three weeks and the completed questionnaires were returned in sealed envelopes to the contact persons, who forwarded them to the researcher. Participants comprised 56 nurses who were randomised for the group of IT-based PE or were in charge of the study on the ward. (Paper IV.)

4.7 Data analysis

In **Phase I**, quantitative and qualitative data analysis methods were used to illustrate the description of the IT-based PE development process. While the program was being

developed, statistical analyses were used on the quantitative data. Basic descriptive methods were conducted (percentages, frequencies) to describe and synthesize information received (Polit et al. 2001). More advanced statistical methods such as sum variables and bivariate statistical tests were used depending on the research questions and study stage. P-values of 0.05 level or less were considered to be statistically significant (Polit et al. 2001). The qualitative data was analysed using inductive content analysis. Themes answering the research questions were picked out from the data, grouped together, coded, and connected to make categories (Graneheim & Lundman 2004). (Paper I.)

In **Phase II**, data analyses were performed in several steps to demonstrate nurses' adoption of the IT-based PE and to identify variables explaining the activity of adoption. In the first step, the date of the education session and the name of the nurse were picked up monthly from the nurses' completed report questionnaires. The aim was to categorise nurses according to Rogers' (2003) diffusion of innovation model. In the second step, nurses' monthly education activity was calculated. In the third step, all nurses' monthly activity percentages were summed and divided by the months that the nurse worked on the ward and by the numbers of patients to be educated on the ward. In the fourth step, each nurse was categorised into a group based on Rogers' (2003) model. In the fifth step, differences between nurses' backgrounds were analysed by using crosstabulation. In the sixth step, descriptive statistics were used: means with standard deviations for normally distributed variables and medians with ranges for skewed distributions. In the seventh step, background information and percentages of nurses were categorised, and differences between categories were tested using Chi-square test for large samples and Fisher's exact test if expected values were too small. A P-value < 0.05 was defined as a statistically significant difference between the groups (Polit et al. 2001). (Paper II.)

Data was analysed using inductive content analysis and statistical methods to describe the daily use of IT-based PE in clinical practice and to identify factors associated with use. The qualitative data analysis started with reading through the written descriptions of the nurses to get the general view (Giorgi 1985, Graneheim & Lundman 2004). The descriptions of use were picked out of the data, similar descriptions were classified, combined and entitled in minor and main categories (Polit et al. 2001). The qualitative data was quantified by counting the number of descriptions in each category. The relation between positive and negative experiences of the use revealed how successful the IT-based PE had been. The original quantitative data and the qualitative data transformed into quantitative format were analysed with descriptive statistics. Factors associated with the IT-based PE were further analysed. Spearman's correlations were tested between continuous non-normally distributed variables and Pearson's correlations between scale variables. After that, all the variables were categorised based on means or medians, and differences between groups were tested using Pearson's Chi-square test or Fisher's exact

test if the expected values were too small (Polit et al. 2001). All quantitative calculations were performed with the SPSS for Windows statistical software (version 16.0). P-values of 0.05 or less were interpreted as statistically significant. (Paper III.)

In **Phase III**, qualitative content analysis was used to evaluate nurses' experiences of the IT-based PE after one year's clinical use. The entire data was read through carefully by bracketing e.g. put aside the priory ideas and expectations (Nieswiadomy 2010) and the content was outlined. The nurses' descriptions, phrases and words in response to the study questions were picked out aiming at comprehension and in-depth knowledge (Moore 1994) with the subjects. The responses were coded, similar expressions were classified as subcategories, combined into categories (Polit et al. 2001, Graneheim & Lundman 2004) and major categories which formed a combined category to describe the studied phenomena. All the categories were entitled according to their content (Graneheim & Lundman 2004). (Paper IV.)

4.8 Ethical approach and specific considerations

Ethical approach started with the selection of the research topic. Adoption of IT-based PE was chosen for the research topic because it is important to know how users can participate and be involved in the development and adoption of a novel method. Studying the program is the only way to ensure that it is as user-friendly as possible, when both views of patients and the staff are considered, and means for further improvement are also found. The mentally incompetent (Sumner 2007) and patients treated in psychiatric hospitals are often regarded as vulnerable individuals (Polit et al. 2001). Their capability to give fully informed consent to participate in a study may be questioned (CIOMS 2002), and some of the patients may have severely impaired decision-making abilities due to their illness (Carpenter et al. 2000). However, knowledge is needed to improve the care (McHaffie 2000, Wood & Ross-Kerr 2006) of vulnerable people and this knowledge can only be gained by studying the treatment (CIOMS 2002).

The ethical guidelines emphasise principles of beneficence, justice (Polit et al. 2001, Haber 2010), human dignity (Polit et al. 2001) and respect for persons (Haber 2010). Ethical guidelines and the legislation on health care (WMA Declaration of Helsinki 2011), the basic principles of research ethics (National advisory board on research ethics 2002, Academy of Finland 2003), and good clinical practice in the conduct of clinical trials (Official Journal of the European Communities 2001) were followed throughout the study phases. While developing the program, the study protocol was reviewed by the ethics committee of the hospital district if patients were involved and the study was authorised by the nursing and medical directors of the study organisations. In conducting the study all the following stages were obeyed (Nieswiadomy 2010): 1) the participant

selection and the research group were described in an information leaflet; 2) participants received information related to the purpose and procedures of the study; 3) potential risks and benefits were described; 4) alternative procedures were disclosed such as place and timing of the data collection; 5) participants could not be identified from the research reports, the collected data were kept safe and only the researcher had access to them; 6) participants received information related to the voluntary nature and right to decline or withdraw from the study without any consequences, and their willingness to participate was ascertained; and 7) participants had an opportunity to ask further questions. Moreover, informed consent was requested in written consent form if patients were involved and all the researchers were trained to carry out the study process.

In **Phase I**, ethical considerations were used while describing both successes and shortcomings in the development process. Moreover, during the development process, ethical effort was put into inpatients' surveys, which were collected at discharge so that the patients felt free to express their opinions honestly for minimising any anticipations for negative consequences e.g. affecting the care. Further, interviews were used so that participants felt free to express their views and the interviews were written down (Morse 1994). As a whole, IT-based PE was produced by using information consistent with the best available evidence on mental health issues and the program was developed according to the Quality Criteria for Health Related Websites (Commission of the European Communities 2002). (Paper I.)

In **Phase II**, the Mieli.Net study protocol was reviewed (ETLR01181) by the ethics committee of the Pirkanmaa Hospital District and the positive statement to use the study instruments was granted. With each patient, a research assistant evaluated in collaboration with the ward personnel whether or not the patient was competent enough to participate in the study. The patients were informed by the research assistant in oral and written form about the study process, as well as about the possible risks such as loss of time, emotional and psychological stress and the benefits related with the study (McHaffie 2000, Cockcroft et al. 2009). If the patients were initially uncertain about participation (Sumner 2007) they had a possibility to meet the research assistant again for participation. If patients were willing to participate, their written consent was required (McHaffie 2000, Sumner 2007) in two copies; one for the patient and the other for the researchers. Before that, the research assistant ensured verbally in common used language (Tschudin 2003) that the patients had understood the information about the study (Bakitas 2005, Wood & Ross-Kerr 2006, Sumner 2007). The research assistants were not working in the study units, which helped the patients to differentiate the researchers' role from the ward nurses (Polit et al. 2001). Patients completed the background questionnaires independently and the researcher was available if needed. The staff was also informed about each patient's participation in the study (McHaffie 2000). The IT-based PE was started several days after patient admission to ensure that the patients were not too confused straight after

hospitalisation and the process was kept as unhurried as possible so that the patients could pose questions and talk freely about the topics important to them. (Papers II, III.)

According to Finnish ethical protocol, nurse surveys did not require written informed consent (ETENE 2001). Nurses were informed about the study before it was started. They had time to discuss the study on the study wards and pose additional questions to the researchers (Polit et al. 2001). Nurses' participation was of voluntary basis but since the nurses worked in the university hospitals in which research is part of the work and the nurses' duty is to inform patients, they were expected but not obligated (Wood & Ross-Kerr 2006) to participate in the study, which was authorised by the directors of the organizations. Nurses' backgrounds and IT capacities were assessed, they participated in tailor-made training related to basic computer, Internet and Mieli.Net program use and they were trained to educate patients by using IT (McHaffie 2000). The nurses had opportunities to receive additional help from the research assistants in emerging questions during the whole study period. (Papers II, III.)

In **Phase III**, the study was authorised by the directors of the organizations. No ethics committee statement was needed because the study did not involve patients. Information sessions with oral and written information were organised for the persons in charge of the study on the wards by the researcher. Assurances of anonymity and confidentiality were emphasized (Polit et al. 2001) and the completed questionnaires were returned in sealed envelopes to the contact persons, who forwarded them to the researcher. (Paper IV.)

5 RESULTS

The results are reported in three parts according to the phases of the study. The first part describes the development process of IT-based PE for patients with schizophrenia spectrum psychosis (Paper I). The second part demonstrates nurses' adoption of an IT-based PE and the variables explaining the level of adoption (Paper II). It also describes the use of daily IT-based PE in clinical practice and identifies factors associated with daily use (Paper III). The third part evaluates nurses' experiences of the IT-based PE after one year's clinical use (Paper IV.)

5.1 Development process of IT-based PE for patients with schizophrenia spectrum psychoses (Paper I)

The development process of IT-based PE was described in various stages (Figure 3). First, user needs analyses were conducted from different perspectives. The national analysis of the developmental areas in Finnish psychiatric hospitals showed that PE is a central intervention used in all the study hospitals. The most common method for information delivery for patients was oral information (100%) and leaflets (84%), IT interventions were used less often (9%). A one-year patient satisfaction survey revealed that although patients were quite satisfied with their care, they reported most dissatisfaction in the areas of information, restrictions and compulsory care. Patients considered access to information about illness, care, patients' rights and different kinds of support to be important. They wanted to receive information in parallel ways through discussions with staff and other methods, such as leaflets, literature and the Internet. Relatives considered PE to be important, emphasized the meaning of receiving information of their own rights also and wanted to have parallel options to receive information. Furthermore, the focused literature review described patients' needs for access to information, use of information supply and items related to patients' information supply. (user needs analysis). (Paper I.)

On the basis of on the user needs analysis, five general informational areas were identified: illness, treatment, well-being, daily activities and patients' rights (see Figure 3). The content for the information areas was produced on the basis of a user needs analysis and also the ICD-10 classification, relevant textbooks, scientific articles and valid national care recommendations were used as sources of information. Moreover, the specific multidisciplinary team provided clinical expertise to the development process within each information area and users in patient associations were involved in the process, too. Information areas comprised information about the illness, schizophrenia and related psychoses. Treatment areas comprised information about the available treatment and rehabilitation options, and outpatient treatments. Well-being covered different areas

dealing with way of life. Daily activities included information about different types of support options. Patients' rights focused on patient status and rights. At the end, resulted content was sent for comments to the members of the expert group, and the material was further revised according to their comments. (information area development). (Paper I.)

A prototype of the IT-based PE was created on the basis of the information area development. This included the design of the outward appearance and information structure. The content, structure, visual appearance and usability (see Figure 3) were evaluated by users in two patient associations, nursing students and nurses. This analysis showed the prototype to be usable and reliable. The visual appearance was successful, while the content and structure needed improvements. On the basis of the prototype evaluation some further changes were made and multimedia applications were developed together with the users and this material was integrated into the prototype. (prototype development). (Paper I.)

After prototype development and to ensure system usability from the nurses' perspective as well, a preliminary usability evaluation was conducted among nursing staff. The evaluation provided ideas for further development and actual testing of the IT-based PE portal for patients with schizophrenia and psychoses. The nurses were quite satisfied with the structure, usability and layout of the portal. However, it required advanced IT skills. According to the nurses the content of the information was relevant, and the text was understandable and easy to read. The portal was considered as beneficial to users, while the possible problems concerned the users' lack of IT experience in using it. The nurses were also concerned about the possible negative affects of decreased face-to-face contact and its impact on delivery of care. (user evaluation). (Paper I.)

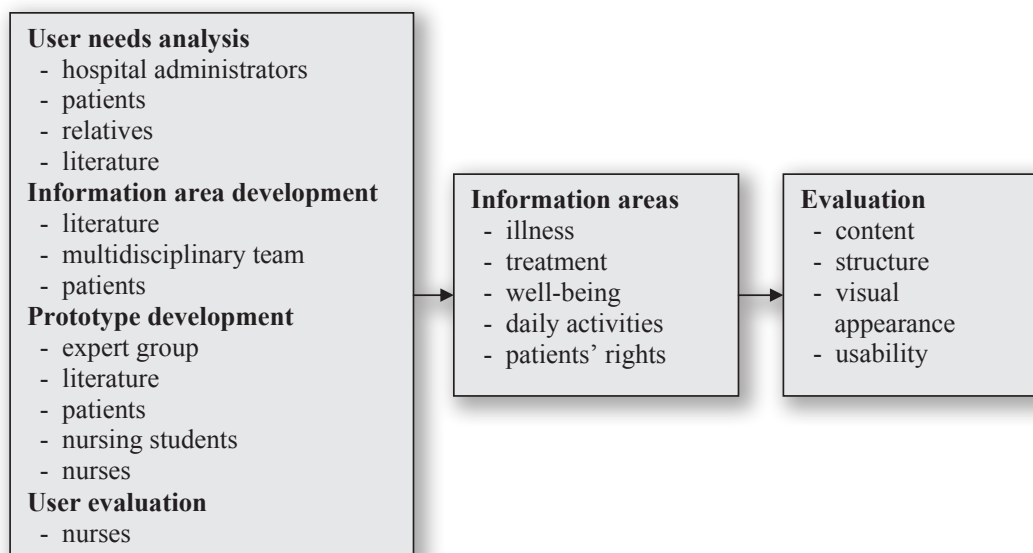


Figure 3. Development process of IT-based PE program

5.2 Adoption and use of IT-based PE in two psychiatric hospitals

5.2.1 Nurses adoption of an IT-based PE (Paper II)

During the 20-month study period, altogether 498 IT-based PE sessions had been conducted by the nurses on the nine study wards. On the ward level, the number of IT-based PE sessions varied from 19 to 106 (median 53) and the number of nurses per ward offering PE varied between five and nine. Nurses' activity in IT-based PE also varied: there was one ward where all the nurses carried out IT-based PE for the patients and one ward where four nurses did not participate in it at all. Altogether, there were 83 nurses out of 100 possible ones who carried out IT-based PE and 17 who did not. The total number of IT-based PE sessions held by each nurse varied from 0 to 23 (median 3). (Paper II.)

The data based on nurses' activity in offering IT-based PE were skewed; from 0% to 93% of possible (mean 13%, median 11%, mode 0%). Nurses' activity in arranging IT-based PE on the wards using Rogers' model as a template showed the share of laggards to be 17%, late majority 72%, early majority 7%, early adopters 3%, and innovators 1%. In Figure 4 allocation received is compared to corresponding groups in Rogers' model. (Paper II.)

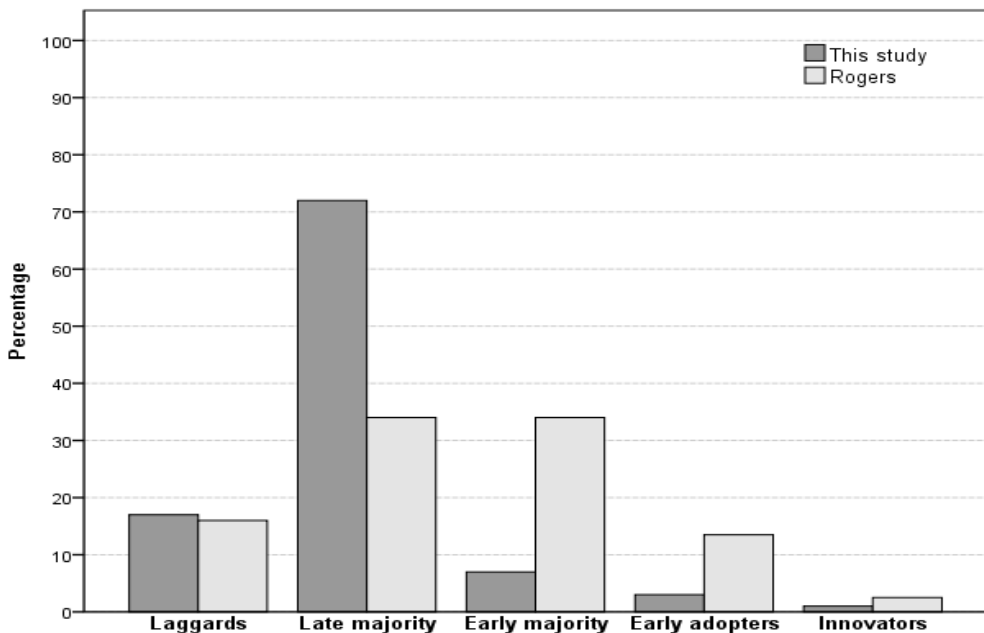


Figure 4. Allocation comparisons between the study nurses' activity in arranging IT-based PE and the corresponding groups in the Rogers' (2003) model

Due to the small number of nurses in the categories formed, the nurses were categorised into three groups according to their activity: laggards (17%), late majority (72%), and a third group adopters (11%) including early majority (7%), early adopter (3%) and innovator groups (1%). The study revealed more laggards and adopters working in hospital A compared to hospital B (65% laggards in A vs. 35% in B and 73% adopters in A vs. 27% in B $p = 0.045$, Pearson's Chi-square test). (Paper II.)

5.2.2 Use of a daily IT-based PE in clinical practice (Paper III)

In total 508 IT-based PE sessions were carried out with 93 patients during their hospitalisations. Seventy-three (79%) of the patients had attended all six IT-based PE sessions and the remaining 20 patients had attended fewer sessions. The characteristics of the PE sessions are showed in Table 2. (Paper III.)

Table 2. Characteristics of IT-based PE sessions

Use of IT-based PE	Descriptive statistics
The length of all PE sessions per patient, minutes, Median (Range)	194.4 (10 - 360)
The days during sessions were used, Median (Range)	10 (1 - 70)
Number of sessions used per patient, n (%)	(93) 100
6 sessions	(73) 79
5 sessions	(8) 9
4 sessions	(3) 3
3 sessions	(3) 3
2 sessions	(3) 3
1 sessions	(3) 3
Educator nurses per patient, Mode (Range)	2 (1 - 6)

Seven (1.4%) IT-based PE sessions were interrupted so that they had to be held on another occasion (two of them with the same patient). Altogether 37 IT-based PE sessions (7.3%) had disturbances due to patients ($n = 14$) or external causes ($n = 23$) (see Table 3). Disturbances due to patients were caused by patients' physical needs, lack of technology skills or mental health problems. External causes were due to poor timing or technology access problems. (Paper III.)

Table 3. Disturbances during IT-based PE sessions

Disturbances	N
Physical needs: toileting, poor eyesight	Patient-based (n = 14)
Lack of technology skills: not knowing how to use a computer and a keyboard	
Mental health related problems: concern (PE increases the duration of care), misunderstanding (was not allowed to buy anything from the Internet and wanted to quit the study), concentration problems (a lot of talk and needed a lot of restricting), tiredness (medication), voice hearing	
Poor timing: a nurse in a hurry (patient seclusion, an educator nurse had to be switched), a phone (a nurse was asked for phone, nurse's or patient's mobile phone rang, patient got a text message), another person interrupted the PE (a nurse picked up ward keys from the educator nurse, a nurse picked up other patients' property, a nurse returned patients' mobile phones, someone visited the room, knocked on the door, rang the doorbell), a patient in a hurry (sign out of the hospital, a sudden visitor, lunch/ dinner time), ergonomomy (heat)	External (n = 23)
Technology: hardware (a computer had to be switched, computer sound was not available, a printer had no paper/ did not work), software (problems logging on to the portal or to register in peer support, network connection failed, computer got stuck, reference page or Internet site for peer support did not open, an evaluation form in the Mieli.Net did not function, question and answer column was closed)	

Nurses' reports of daily use of IT-based PE sessions were successful with no problems (n = 69, 74%) or less successful with variety of problems (n = 24, 26%). Patients were positively disposed towards IT-based PE. Motivated patients were keen to take part in the education, they were interested and active. Nurses described patients' mental state as good, patients were calm and in a good mood. Patients' IT skills were reported to be good and they did well in the IT-based PE. Patients were pleased with the intervention and received information they needed. Likewise, there was less successful IT-based PE. The nurses reported that patients lacked interest and were not active. Patients' mental state was poor, their psychiatric symptoms became worse during IT-based PE or they lacked of insight into their illness. Equipment for IT-based PE did not work well, patients' IT skills were poor and there was too much information in a single PE. Patients gave negative feedback on the intervention or the content of the IT-based PE was too familiar to them. (Paper III.)

The more IT-based PE sessions a patient attended, the more nurses were involved (Spearman's rho = 0.28, p = 0.006). Patients whose education took more days had poorer mental status than those whose education was run over a shorter period (Spearman's rho = -0.25, p = 0.018). Moreover, the length of IT-based PE was shorter for patients who had no vocational education compared to patients with vocational education (Pearson's Chi-square test, p = 0.032). Patients having a vocational education also had more successful education than patients without vocational education (Pearson's Chi-

square test, $p = 0.015$). Patients attending all six IT-based PE sessions had more often more nurses involved (Pearson's Chi-square test, $p = 0.049$). The group of patients with schizophrenia had fewer successful IT-based PE sessions than those with other mental health diagnoses (Pearson's Chi-square test, $p = 0.009$). Further, IT-based PE took more days in hospital B (Pearson's Chi-square test, $p = 0.022$). (Paper III.)

5.3 Nurses' experiences of the IT-based PE after one year clinical use (Paper IV)

The nurses described that there were advantages and disadvantages for both patients and nurses of the IT-based PE. From the patients' perspective, the nurses experienced the IT-based PE as a broad information source for patients and a relevant source of information for patients' relatives also (information source). The nurses described that the IT-based PE was a self-help aid for patients and a stimulating tool encouraging them to ask questions (self-help aid). IT-based PE was usable in psychiatric nursing especially for those who were experienced and skilled in using computers and the Internet (usability). (Paper IV.)

From the nurses' perspective, IT-based PE was a nursing aid, enabled wide-ranging discussion between a patient and a nurse, and helped to pay attention to patients' resources and wellbeing (nursing aid). IT-based PE was an innovative and inspiring opportunity for nurses which would modernise nursing and add new dimensions to nurses' professional skills (motivating method). The IT portal was a supportive, fast and thorough information source, and it was pleasant for nurses to use (supportive IT portal). More detailed information about advantage categories and subcategories of the IT-based PE for patients and nurses has been showed in Table 4. (Paper IV.)

Table 4. Nurses' experienced advantages of the IT-based PE for patients and nurses

Patient categories and subcategories	Nurse categories and subcategories
Information source understandable individual neutral	Nursing aid informs enables interaction outlines nursing
Self-help aid motivating helping to provide insight uniting	Motivating method rewarding innovative educational
Usability easy to use available clear	Supportive IT portal functional informative logical

There were also disadvantages that nurses described of IT-based PE from the patients' perspective. Nurses considered that the patients were too ill to be educated and the portal might not be of benefit for all patients but rather make them more confused (poor mental state). The nurses doubted the patients' motivation to use the portal afterwards, and some patients had also commented that they lacked interest towards the portal (motivation problems). The nurses thought that poor IT skills of the patients were an obstacle to IT-based PE and neither were patients able to learn the portal use as quickly as would have been required (IT obstacles). (Paper IV.)

From the nurses' perspective the disadvantages of the IT-based PE were insufficient resources. The PE was experienced to take too much extra time from nurses' routine working. The patients also needed time to understand the information given, and there was too little time for this. Further, the technical equipment was not always available, nurses did not feel comfortable with IT, or the portal had not been easily available (insufficient resources). Nurses' negative attitudes concerned the extra work due to the IT-based PE or these were related to some contents or expressions in the portal. The nurses also criticised the portal itself, they were unwilling to use it or were unmotivated. This could be the case, if the patients were more advanced in IT skills than the nurses (negative attitude). More detailed information about the disadvantage categories and subcategories of the IT-based PE for patients and nurses has been showed in Table 5. (Paper IV.)

Table 5. Nurses' experienced disadvantages of the IT-based PE for patients and nurses

Patient categories and subcategories	Nurse categories and subcategories
<p>Poor mental state lack of concentration seriousness of the illness</p>	<p>Insufficient resources time room IT skills</p>
<p>Motivation problems lack of interest lack of intention to use afterwards</p>	<p>Negative attitude extra work simplicity of the IT portal lack of motivation</p>
<p>IT obstacles lack of skills lack of support</p>	

5.4 Summary of the results

The development process of IT-based PE for patients with severe mental health disorders was described from different perspectives and carried out in several stages. (Paper I) Nurses' adoption of an IT-based PE in two psychiatric hospitals demonstrated there to be

83 nurses out of 100 who carried out IT-based PE sessions, and organisation e.g. hospital to be the only variable that differed in program adoption. (Paper II) In total, 93 patients received around 500 IT-based PE sessions during hospitalisation and almost 80% of patients attended all the planned sessions. There was more successful than less successful IT-based PE sessions and factors associated with use were patients' vocational education level, mental status, diagnoses, number of nurses involved and hospital. (Paper III) After one year's clinical use, nurses evaluated there to be advantages and disadvantages for both patients and nurses of the IT-based PE which concerned the IT-based PE as a whole and the Internet portal developed. (Paper IV.)

Nurses' adoption of an IT-based PE in two psychiatric hospitals demonstrated the adoption process to be more slowly but the amount of laggards and innovators to be similar than in Rogers' (2003) model (see Figure 5, Appendix 2). Adoption of IT-based PE in psychiatric nursing is supported when all the user groups are involved in the development process and the existing literature is used. This is a way to make sure that IT-based PE is user-centered and accessible and support the users' later on. Nurses can be educated and supported on the use of IT-based PE. However, motivation and need satisfaction of users is essential and the way the IT-based PE is integrated in clinical practice. Evaluation during and after the process gives valuable information and feedback for the adoption about functionality, usability and time take of the IT-based PE. (Papers I-IV.)

6 DISCUSSION

6.1 Validity and reliability

In general, a valid study measures what it is supposed to measure (Polit et al. 2001, Wood & Ross-Kerr 2006). It includes features such as internal validity, which refers to the extent to which the results are a true reflection of reality (Carter & Porter 2000) and external validity, which refers to the generalizability of the research findings to other settings or samples (Carter & Porter 2000, Polit et al. 2001, Nieswiadomy 2010). In qualitative studies, the concept “credibility” refers to the quantitative concept “internal validity” and the concept “transferability” to concept “external validity” (Currie 2005). More detailed, population validity relates to whether the results can be generalised to different groups of people and ecological validity to whether the results would apply in other places and contexts (Carter & Porter 2000).

Reliability refers to the consistency, stability, and repeatability of a data collection tool (Wood & Ross-Kerr 2006). A reliable measure maximises the true score component and minimises the error score component (Polit et al. 2001) and means that an unreliable measure cannot be valid (Carter & Porter 2000). Moreover, accuracy is a function of reliability, meaning that the better the reliability, the more accurate the results (Eldridge 2007) and credibility refers to confidence in the truth of the data (Polit et al. 2001). In qualitative studies concept dependability refers to quantitative concept reliability (Currie 2005).

In **Phase I**, validity is evaluated through content, generalisation and face validity. Content validity evaluation focuses on the description of the IT-based PE development process; that it describes the process in a supposed way (Polit et al. 2001, Wood & Ross-Kerr 2006). In this study, content validity was supported by using mixed methods description in which the strengths are used from the both qualitative and quantitative methods and which together offer a wide and profound understanding of the research subject (Long & Boswell 2007). The generalizability of the IT-based PE development process was considered throughout the study stages. The results of a nationwide study stage can be generalised to all Finnish psychiatric hospital settings (Carter & Porter 2000, Polit et al. 2001) and it also covers the possible variations in PE practices in Finnish psychiatric hospitals (Carter & Porter 2000). The results from stages of purposive sampling are not generalisable but rather reflect the reality (Carter & Porter 2000) due to multiple settings and a large number of participants from a variety of backgrounds. This was supported by the assumption that the assessments of the selected participants have proper face validity as they function as experts in their roles in psychiatric nursing. Moreover, the face validity of the researcher’s description about the development process of the IT-

based PE was supported by the results of the literature search (Nieswiadomy 2010), but it was threatened by the fact that the development process had started far earlier than the researcher became involved in the study. Therefore, descriptions of the early stages of the study are based on second hand information.

The reliability (Polit et al. 2001, Wood & Ross-Kerr 2006) of different stages has been evaluated in detail in articles describing the different stages. However, the reliability of the IT-based PE development process description was strengthened by using mixed methods design (Long & Boswell 2007) to gain a more comprehensive understanding of the topic studied and to gain more credible (Polit et al. 2001) and accurate (Eldridge 2007) results for the description.

In **Phase II**, even if the IT-based PE was designed to fit the context, it seemed to have some weaknesses and limitations regarding validity and reliability. Validity issues were considered through content and construct validities and the generalisation of the results. The proper content (Wood & Ross-Kerr 2006) and construct (Carter & Porter 2000) validities were supported by comparing the content, the results and the underlying theory with the results of the focused literature search e.g. testing the link between the results and the underlying theory. Rogers' model suggests that individuals are classified according to the schedule of their uptake with an innovation (Rogers 2003). However, in this study the time factor was difficult to include on the design which decreased the content validity (Wood & Ross-Kerr 2006). In previous studies, the instruments measuring adoption of a new method have mainly been self-rated scales assessing attitudes (Gosling et al. 2003, Cheng et al. 2004, Milner et al. 2005). In this study the categorisation of adoption was based on the percentage of IT-based PE sessions carried out per nurse, which was not a standardised method but can be regarded as an accurate measure (Carter & Porter 2000) on IT-based PE adoption among nurses.

Transferability (or generalizability) validity refers to the extent to which the results from the data can be transferred to other settings (Polit et al. 2001). An important question in this sense is if the adoption would occur to the same extent in another psychiatric setting. In this study, the results may have limited applicability to other mental health care settings since the data were collected in two psychiatric hospitals and the study sample comprised 100 nurses, whose background variables were known. Moreover, ward managers could have been supported more so as to mainstream this innovation actively within an organisation (Greenhalgh et al. 2004).

In this study, reliability was threatened since the number of patients to be educated by the IT program varied between study wards. Moreover, adoption of innovations is more successful when it is based on the needs of users (Rogers 2003). In this study, even if the nurses were involved in the developmental process, ideas could have been exchanged

still more collectively among the staff during the implementation process since not all the nurses understood the importance of PE.

Moreover in Phase II, generalisation and content validity would have needed more support when describing the daily use of IT-based PE in clinical practice. While the study was conducted in two hospitals with a specific educational program the results may be too specific to be generalised to other psychiatric settings (Carter & Porter 2000, Polit et al. 2001, Eccles et al. 2003). On the other hand, there were as many as 508 IT-based PE sessions with 93 patients that were carried out by 83 nurses, which markedly increases the generalizability of the results. It is also hard to say if the intervention would work with different patients (Polit et al. 2001). The study also combined quantitative and qualitative data, which is always a challenging but at the same time a methodologically strengthening way to combine data (Long & Boswell 2007) and to gain knowledge from the topic studied.

A further limitation concerns the IT-based PE report instrument and more specifically the validity of questions (Carter & Porter 2000). Constant error may result in the assessments of social desirability, when the nurses responded about the use of IT-based PE and patients acted in a way they believed was expected (see Hawthorne and Rosenthal effect Nieswiadomy 2010). This may have occurred although the nurses were advised to complete the report instruments in a truly honest way. Nurses may also alter their behaviour during development processes and be either enthusiastic or sceptical about new methods of doing things. Nevertheless, the reports yielded information that would be difficult, if not impossible to gather by other means. The strength of observational methods is that they gather information from verbal and nonverbal communication, activities and environmental conditions. Therefore the information that the nurses provided should be regarded as true and assume that the nurses were frank. (see Polit et al. 2001.)

Validity was threatened since the observations were not supplemented with information from unstructured interviews or conversations, as an example. On the other hand, the need for some kind of systematic log, events record or at least a category scheme which would involve a list of all behaviours and characteristics it was required to observe and record during PE sessions, were compensated by the collected field notes, which included broad, analytic and interpretive information. The nurses' training, qualifications, and experience were important when establishing a confidential atmosphere in IT-based PE and they were in a position to record patients' behaviours and appeared to be very sensitive observers. (Polit et al. 2001).

Faulty wording of the questions can impair both the validity and reliability of the questionnaire (Wood & Ross-Kerr 2006). This was realised in the study because there

was marked variation in completing of the reports. According to Carter & Porter (2000), wording defects in pen-and-paper instruments cause lack of clarity and result in respondents providing different responses, and due to instrument format, questions on the same topic may be answered differently. On the other hand, there were open-ended questions in the reports in which the nurses had a possibility to list all the relevant factors and sudden changes (Eccles et al. 2003). A pilot study was also conducted with patients and nurses on the usability of a newly designed report instrument (Nieswiadomy 2010), and it helped nurses to complete the instrument which increased both validity and reliability.

Moreover, reliability comprised the consistency, stability, and repeatability of the research instrument. When the nurses made observations of IT-based PE, it is possible that their presence generated special behaviour among patients (Dreher 1994) and may also have changed the nature of the data collected (Wood & Ross-Kerr 2006). However, patients' personal nurses were not supposed to educate patients using IT, which might have weakened the trusting and confidential relationship between a patient and nurse (Dreher 1994) or has been a supportive element regarding the content of the PE, e.g. interactive information provision and support for patients to live and cope with their illness. Repeated measurements over time using the same instrument is also expected to produce similar results (Wood & Ross-Kerr 2006). However, in this study, the nurses gained experiences during the IT-based PE and their ways of educating patients must have changed along the way.

Inter-rater reliability (equivalence) could also have been used in this study by having two trained observers (Polit et al. 2001, LoBiondo-Wood & Hamer 2010), which would have increased the reliability. Moreover, in this kind of IT-based PE random errors such as environmental factors (noise, location), subject-related personal factors (mood, anxiety, tiredness), and researcher-related factors (biases) may impair the reliability (Carter & Porter 2000).

In **Phase III**, face validity and transferability were considered. The validity of the data analyses was ensured by the face validity method (Polit & Beck 2004) which was enhanced by including numerous quotes from nurses' answers when reporting the study findings. On the other hand, the nurses' perspectives were used to present patients' experiences, which decreased validity. Nevertheless, the nurses interacted with the patients during the IT-based PE and may have had a good understanding of the patients' experiences, culture and social roles (Wood & Ross-Kerr 2006) in the area of mental health. Transferability was threatened by the fact that the data were collected on nine acute wards and the sample comprised only limited number of nurses, which means that the results may have a restricted applicability in other mental health care settings even though the goal of this type of qualitative study is primarily not to generalise findings (Polit & Beck 2004, Mauk 2009).

Interrater reliability was supported by determining if both researchers obtained similar results (Wood & Ross-Kerr 2006) and by peer discussions to ensure that the data had been correctly interpreted. Two researchers analysed the same data independently and the contents of the analyses were compared and reanalysed until the outcome of the process was agreed. On the other hand, the reliability was threatened by the fact that likely most active and motivated nurses answered the questionnaire and also the most positively disposed patients participated in the IT-based PE and affected the nurses' experiences.

6.2 Discussion of the results

6.2.1 Description of development process of IT-based PE (Paper I)

In **Phase I**, when describing the content of an IT-based PE, the quality of a program is a major concern. People with mental health problems are especially vulnerable to the varying quality of Internet health information (Houston & Allison 2002) and many studies have revealed the poor quality of the Internet sites in general (Kisley & Takyar 2003). However, IT-based PE material offers a solution to the ease of reproduction, update and adaptation of content with regard to individual requirements (Doupi 2005). On the other hand, it is important to note that lack of adequate PE available to all can be seen as a shortcoming (Redman 2001). The patients with mental health problems need guidance and tools to help them to navigate and select information from the available Internet health sites (Eysenbach & Köhler 2002). Therefore the existing Internet sites were taken into account in the development process, and the information content was produced by using knowledge that is consistent with the best available evidence on mental health issues. According to Redman (2001), after preview, an instructional product should undergo two steps to improve its effectiveness as a teaching tool; product verification and revision, which were also described to be done in the development stage. However, there is still a need for further research of developing such interventions and their evaluation (Gagnon et al. 2009) and new methods need to be tested so that they have potential to foster recovery and improve the emotional well-being of patients (Watson et al. 2006). Therefore development processes have to be described for possible later use.

6.2.2 Demonstration and description of IT-based PE adoption and use (Papers II-III)

In **Phase II** no significant differences were demonstrated between program adoption and the background variables studied: age, education, computer skills, computer access, attitude to computer use, attitude to technology and male gender. This is an encouraging result for psychiatric nursing, where personnel may face implementation barriers (Koivunen et al. 2008a) and lack technical support, interest and learning goals in relation

to their skills (Koivunen et al. 2008b). Nurses may consider IT-based PE to have no place in psychiatric nursing (May et al. 2001) since the technology used in education is underrepresented (Alexander & Staggers 2009). There are still possibilities to pay attention to gaps in the adoption process such as nurses' tailor-made training related to basic computer skills, Internet and program use, and by giving them additional help when needed. Key issue identification focusing on the core individuals influencing the adoption of IT would help to design more specific, professional and tailored interventions (Gagnon et al. 2009). Moreover, it is important to identify the true opinion leaders according to requirements of an innovation and to tailor different strategies to meet the needs of the innovation. Users' needs and perspectives need to be communicated and opinion leaders should support the users to make evaluative decisions about the innovation. (Greenhalgh et al. 2004.) Normative beliefs related to social pressures either facilitate or hinder the intention to use interventions among nurses (Kortteisto et al. 2010).

Within the group of nurses studied, the late majority group was larger and the early majority group smaller compared with the Rogers' (2003) diffusion of innovation model. This finding may be explained by a study period too short to reveal a real adoption process with nurses still in a slow stage of acceptance (see also Gotham 2006). However, Rogers' (2003) model could well be applied to illustrate how IT-based PE is adopted in the field of psychiatric nursing. The nurses' level of adoption differed depending on the hospital in which they worked. Size of an organisation has been found to influence the propensity to adopt; larger organisations feel a greater need to adopt innovations in order to support and improve their performance (Frambach & Schillewaert 2002, Alanen et al. 2007). Further, functionally differentiated and professionally specialised organisations with decentralised decision-making structures adopt innovations more readily (Greenhalgh et al. 2005).

On the ward level, nurses' activity for carrying out education was markedly varying. Therefore, key issue identification with respect to organisational factors influencing IT adoption would have been of help in designing more specific and tailored interventions (Gagnon et al. 2009). According to Rozenblum et al. (2011), an Internet-based health policy needs to be tightly aligned with the major strategic directions of health care reform and adoption needs to be actively fostered through a bottom-up, clinical needs-first approach, a national investment policy, and financial incentives based on patient outcomes. Moreover, the developmental projects need to be managed in parallel with clinical practice changes, to ensure that the new technology supports the practice change and that technology is available to make a clinical practice change possible e.g. to ensure that IT is used to change clinical practices in nursing care (Murphy 2010).

According to the descriptions of daily IT-based PE use in Phase II, it can be used with patients with serious mental health disorders. All possible IT-based PE sessions were

carried out for almost 80% of patients and only 2% of them were discontinued. This is a very encouraging result in acute psychiatric care, where nurses may have concerns that patients cannot be educated because of their poor mental state (see also Pekkala & Merinder 2002, Ross & Goldner 2009) or lack of insight (Fernandez et al. 2006). It is important that the nurses considered patients' mental states leading to slower progress with PE if the mental status was poor even if the PE sessions were not systematically planned by the nurses. Individual factors associated with daily use of successful IT-based PE were the more trained nurses available the number of sessions carried out with each patient. The PE was not used solely with the personal nurse.

The total number of disturbed sessions (less than 10%) was relatively low given that acute in-patient wards are considered to be restless (Joyal et al. 2008) and nursing staff are often busy (Janes et al. 2005, Koivunen et al. 2008a). Technology or time related problems disturbed IT-based PE more often than problems due to patients. On the other hand, strategies such as IT-based interventions are accessible worldwide, and although they require the involvement of trained staff, they offer hope for more consistent treatment models across settings (Rotondi et al. 2005). Organizational factors (Or & Karsh 2009) also affect the use of IT-based PE, so that in another of the study hospitals the nurses adopted the program more evenly. The PE took more days in one hospital compared with the other studied which may indicate that the nurses influence each others' attitudes on the wards (van Achterberg et al. 2008) or the treatment period lengths are different between the hospitals.

6.2.3 Evaluation of nurses' experiences of the IT-based PE after one year use (Paper IV)

In **Phase III**, IT-based PE was evaluated to include both advantages and disadvantages in inpatient psychiatric care. In psychiatric nursing, IT-based PE makes it possible to try to influence patients' knowledge and attitudes, which may otherwise be problematic (Kikkert et al. 2006, Wong et al. 2006). IT-based PE is an alternative that may promote and assist the evolution of co-operative health care practice (Doupi 2005). On the other hand, according to Nicholas et al. (2010) as an example, patients may not want to think about their illness, may not be ready to accept their diagnosis and express the opinion that they may have enrolled in the intervention too soon after their diagnosis has been determined. Moreover, patients mention time-related factors such as lack of motivation, being forgetful or lazy about completing the intervention. Some patients might no longer feel the need to participate in the intervention once their mood has stabilised and they are feeling well again, and they would revert to the information only when feeling depressed. (Nicholas et al. 2010.) From the nurses' perspective, lack of IT skills can increase the motivational problems with learning new skills such as IT-based PE (Janes et al. 2005), with participating in the intervention and in following the protocols (Drumm et al. 2003).

In rare cases, IT-based PE was seen to be of no use to the patient or to the psychiatric nurse and not to support people but to confuse them.

IT-based PE was considered to take time away from the basic nursing care. Time constraints and staffing deficiencies have been found in earlier studies to constitute barriers (Janes et al. 2005, Dexheimer et al. 2006). However, in some cases patients may also have time-related problems, such as being too busy or life being too hectic (Nicholas et al. 2010). Unfamiliarity with computers (Kildea et al. 2006) and staff lacking IT skills prevent them from deriving maximum benefit from computers and the Internet (Janes et al. 2005). Lack of employer support for PE has also been observed as an obstacle to benefits (Secker & Gelling 2006, Walker 2006). Therefore, professional culture and working practices are in an important role in IT implementation (Oroviogicoechea & Watson 2009) which can be understood as active and planned efforts to mainstream an innovation within an organisation (Greenhalgh et al. 2004). Realistic evaluation e.g. what works, for whom and in what circumstances is an adequate method for IT assessment and understanding how and why an IT system works. This kind of evaluation and feedback loops e.g. early positive experiences encourage other positive experiences (Byng et al. 2008) have a greater impact on future design and implementation than simply knowing that it works (Oroviogicoechea & Watson 2009). This is also a way for other parties to understand what were the successes and shortcomings and what conclusions should be drawn from the experiences gained (Wensing et al. 2005, Nelson 2009).

6.3 Implications of the study

Patients with chronic illnesses are most likely to need and use Internet services if services are convenient and the patients perceive that the positive experiences outweigh the negative ones. Therefore, when patients are involved in the development process, it will ensure that the Internet sites become user-friendly, the information is personalised, and patients' viewpoints are taken into account. Developing user friendly Internet sites extends the reach of services with limited access of care and stigma. After the patients have learned to use the program and received information about reliable Internet sites, it is possible for them to use it afterwards at home. This may give them a feeling of success even in small steps with IT, which may further support their self-confidence and sense of coherence.

The program was used and tested in practice in the area of psychiatric nursing, which offers valuable information for health care practitioners and policymakers. The structure and time schedules of IT-based PE should be planned in a way that the necessary resources including technical equipment and a peaceful room will be available.

➤ Nursing practice

It is important to invest effort in IT-based PE during patients' hospitalisations and to use it even with patients suffering from serious mental health disorders. The structure and timing of IT-based PE should be planned together with each individual patient and mental states of the patients ought to be considered. IT-based PE offered to patients should match the patients' interests and individual needs, and nurses offering PE are in an important role because of their knowledge of these patients and their problems. IT-based PE can be integrated into the personal nurses' work and it should be implemented in existing PE practices. It is a patient-centred intervention involving a variety of interaction; it supports nurses in their everyday work and can be used without fear of losing the interaction between the patient and the nurse. It is also a way to deliver better care and have better time management with health educated patients. Therefore, personnel should begin to refer patients to established, credible and well-maintained Internet sites that provide PE on common psychological problems.

➤ Nursing management

IT-based PE adoption is feasible for all nurses regardless of their background even on acute in-patient wards with a large number of hospitalised patients. This is important information when recruiting the nursing staff. However, it is critical to reach the right people as early as possible in order to avoid an innovation being underused. An innovation is more likely to be adopted if its supporters outnumber its opponents. Therefore, when planning the development projects, it is important that a clear and overall aim is formulated, a team that has both sufficient expertise and motivation has been put together, and a realistic timetable and resources has been drawn up. Nurses need to be involved in the system development and evaluation at the earliest possible stage to ensure representation of nursing needs in the system and therefore allocation of resources has to be both adequate and continuing. To ensure high-quality IT-based PE, it is important that it is carried out in concordance with clinical practice. It should be linked with existing knowledge bases, skills, values, strategies and technologies and it is important that the staff gets regular feedback on the outcomes of adoption and the fact that the outcomes have been monitored. Nurses' regular meetings and monitors help to provide individual support for those who need assistance the most and also to those whom the others go for advice. Nurses and the whole staff may also be at different stages of implementation process and therefore have different needs. In clinical practice nurses need to be motivated, assured of the usefulness of IT-based PE and of the fact that it is not meant to be used only between a personal nurse and his/ her patient but also in a larger context of clinical psychiatric practice.

➤ Nursing education

Nurses need material and support to understand why IT-based PE is beneficial to patients as well as to themselves. Therefore, it is important to educate psychiatric nurses to understand that they have to have IT skills and have to educate themselves to find health information which is of good quality. Every nurse should be educated and engaged to use accurate Internet sites, carry out IT-based PE and to gain more positive attitude towards IT-based PE by understanding its potential to both patients and nurses. Moreover, by targeting the education first at the most active nurses aid them to support the less active ones.

➤ Societal implications

A good organisation culture for the implementation of new procedures includes active leadership, quality culture, training and collaboration. IT adoption requires time and therefore environmental factors, existing procedures and management systems need to be evaluated so as to ensure that the staff has enough time and that they are involved in the implementation process. The evaluation of established services helps to examine how and in what circumstances they seem to work. Evaluation also guides effective development and implementation of IT services to enhance clinical practice, especially if good documentation and measurements are available. Further, evaluation extends the reach of services to the provision of cost-effective methods.

In the future, more emphasis should also be put on centralized and uniform services which make planning and management much easier. Hence, there is a need to invest in IT infrastructure with the necessary education, training and support onsite, over the Internet as nurses' work on hectic wards. After the patients have been discharged from the hospital, outpatient workers could consider requesting for example, that patients complete homework assignments and sent the completed documents back to the therapist or uploaded them to an Internet site where they can be viewed by the patient at a later date. Moreover, interpersonal influence through social networks is a dominant mechanism for adoption and the information obtained can be used when developing transparent and usable methods in psychiatric nursing. In the future, the involvement of users and ensuring high quality health information should be enabled. Therefore participant engagement is needed at every level of program adoption from a variety of users.

6.4 Suggestions for future research

- More information is needed on usability, accessibility, motivational, educational and organisational factors when developing and implementing IT-based PE in mental health care services
- Factors having an effect on the adoption and implementation of IT-based PE in psychiatric nursing should be understood
- More information is needed about how patients are supported by IT-based PE
- More information is needed about how to navigate Internet sites, use social media and discuss about them with patients having severe mental health disorders
- Organisational and leadership questions need to be studied from the perspective of how the organisation is disposed towards PE, IT, nurses' skills development and nurses' support from their leaders
- More information is needed about how to train and support nurses to use IT-based PE in their daily clinical work, especially the most passive ones

ACKNOWLEDGEMENTS

This study was carried out at the Department of Nursing Science, University of Turku. During the study process I have received support from many people and I would like to thank everyone involved. In particular, I would like to thank some of them by name.

I wish to express my sincerest and warmest gratitude to my main supervisor, Professor Maritta Välimäki, PhD. Her scientific and contextual expertise, creative questions and never ending encouragement have been essential in my study process. She was the one who kindled my research enthusiasm. I also wish to sincerely thank Acting Professor Minna Kaila, PhD, my second supervisor. She contributed her scientific knowledge, encouraged and believed in me. My very special thanks also go to the members of my thesis committee Professor Pirkko Nykänen, PhD and Adjunct Professor Merja Miettinen, PhD. Their valuable comments and suggestions aided me substantially in different phases of the study process.

I sincerely thank Professor Kaija Saranto, PhD and Adjunct Professor Olli Kampman, PhD, the official reviewers of the thesis. Their careful review and constructive criticism improved and clarified the thesis remarkably.

I respectfully thank Professor Helena Leino-Kilpi, PhD, the chair of the Department and director of the Finnish Doctoral Program in Nursing Science, for research facilities, support and understanding during the study process. I also received assistance and encouragement from many people at the Department and on the Finnish Doctoral Program and I would like to warmly thank everyone.

I am grateful to co-authors Raija Kontio, PhD and Jaakko Herrala, PhD. Their contribution to the papers has been valuable. I also want to give a special thanks to Tiina Luukkaala, MSc, for her statistical help with Papers II and III. Her special expertise and patience concerning suggestions I made were very important to the final research process. I also wish to thank Virginia Mattila, MA, for the revision of the English language at remarkable speed on demanding time schedules. I am privileged to have Pirjo Mettänen, MA, in my family and have her to check the Finnish abstract.

My very special and humble thanks are expressed to the organisations where the study was carried out. I want to thank all the patients and the staff who participated in the study. We shared unique times during the study process in another of the study hospitals and I want to thank everyone for their co-operation. I also want to thank research assistant Riitta-Leena Hietala, RN, a colleague of mine. Our discussions were something that gave me support to keep on going in daily research practice.

I warmly thank my fellow students, researchers Anneli Pitkänen, PhD, Heli Hätönen, PhD, Marita Koivunen, PhD, Lauri Kuosmanen, PhD, and Tiina Jakobsson, MNSc, for sharing their ideas, expertise and patience during the process. It has been honour to follow them and I really hope our collaboration will continue in the future. I also want to thank everyone in the seminar group in the Department of Nursing Science. We have been sharing many experiences and worries during the past years. The many scientific discussions have made me feel either proud of my scientific knowledge or helpless due to the gaps in it. The seminars provided a place for us to receive and to give support.

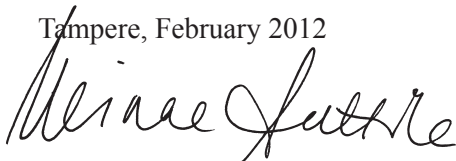
I thank all my relatives who have supported me and shared my life in these years. I am grateful to my father Jouko. You taught me the value of hard work. My brother Kai has a special place in my heart and I want to thank you and your family. I warmly thank my sister-in-law Maarit and your family, my grandmother and godmother Anja, my father-in-law Veijo, and our godchildren Eeva, Aapo and Taneli for forgetting scientific life when meeting each other. Additionally, I think with warmth of my aunts and all my friends. I especially want to thank Mari for sharing all these years' up and downs with me and Marjo for being such a joyful colleague. Special thanks to Hanna and Juho for your kind accommodation help and discussions about academic life during my many visits to Turku.

Finally, I owe my deepest gratitude to my husband Pasi. You have always believed in me, been supportive and helpful even in practical things and have always unconditionally loved me. Our children Jenny and Kalle, you have been the most wonderful thing and the greatest achievements in my life. It is because of you that I have learned to enjoy little things in life and to be able to prioritise things. I am privileged to be your mother. I am grateful to all of your patience, love and understanding during these years.

These last few years have been especially hard because of several losses in our lives; my beloved mother Raija, mother-in-law Seija, aunt Leena, grandmother Sylvi, and grandfather and godfather Aatos. I wish you were still here with us, we would have needed you.

Finally, I am personally grateful for the Doctoral Candidate position in Finnish Doctoral Program in Nursing Science which gave me a chance to pursue my studies full time for the last few years. This study was also a part of the Mieli.Net project which was financially supported by the Academy of Finland, the Yrjö Jahnsson Foundation, the Medical Research Fund of Tampere University Hospital, the Finnish Foundation of Nursing Education, and the Paulo Foundation. I gratefully acknowledge all the sponsors of my dissertation.

Tampere, February 2012

A handwritten signature in black ink, appearing to read 'Mirna Järvelin', written in a cursive style.

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APPENDIX 1 Literature search

In order to understand the adoption of IT-based PE developed for patients' and nurses' use in psychiatric nursing a literature search was conducted in 2011. The search included the CINAHL (from 1995), the Cochrane Library and the Ovid MEDLINE(R) (from 1995) databases. The studies referred to were mostly published after the mid 1990s because until that time the Internet was not widely used by the public (Gromov 1997).

The literature search used keywords in relevant combinations. The IT literature was searched using the following terms: (information, computer, technology, Internet, electronic, on-line and medical informatics). The PE literature was searched using the following terms: (teaching, learning, counselling, guiding and informing). Moreover, search terms such as (program, system and application), (design and development), (mental and psychiatry), (use and adoption) and (exposure, duration, evaluation, computer evaluation, framework) were used when the literature review was carried out.

The literature related to IT varies depending, for example, on the discipline, system, time and focus of the study. Therefore the concept in the publications related to IT and included in this doctoral study differs, and was also aimed to illustrate the concept variation in the study field. Terms mentioned in the literature search are often used synonymously or they may have slight differences, which is beyond the focus of this study. Therefore, at the summary phase, the concept IT-based PE illustrated the combination of all these concepts and was chosen to be the concept used in this study.

Additionally literature search included the manual searching of journals and the reference lists of any relevant reviews identified. Searches were conducted in the Internet using Google, and the Internet sites of various organizations, such as the Finnish ministries (Ministry of Education, Ministry of Finance, Ministry of Social Affairs and Health, and Ministry of Transport and Communications), the National Institute for Health and Welfare, WHO and the European Union were conducted to provide understanding on the topic studied. All searches were confined to literature published in English or in Finnish.

APPENDIX 2 S-shaped curve of Rogers' (2003) model and this study

