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Nurses' Competence in Information and Communication Technology (ICT) Usage in Patient Care

Literature review

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The purpose of this literature review was to explore the scope of competence necessary for the use of information and communication technology (ICT) in nursing care.

The data for this project was collected in spring 2014 through databases of CINAHL and Medline with keywords of ICT, Information and Communication Technology, Nursing and Caring. Nine articles that fulfilled the inclusion criteria were reviewed ad analysed according to the principles of deductive content analysis with a categorization matrix developed on the basis of competence definition. The categories describing general competence were: skills, knowledge, attitude, and personal predispositions.

A result of this final project is a description of nursing competence required for ICT based care. The skills and knowledge categories include four subcategories each with the key competence of IT skills and training and development. The attitude and personal predispositions include five subcategories each with key competence of positive attitude and interest.

Competent provision of nursing care through ICT demands diverse skills and knowledge as well as adequate attitude and personal predispositions. Versatile training should be provided for nurses and nursing students to assist them in achieving competence in this area. Moreover, further studies could determine the level of competence and its diversity in utilization of various digital health care provision models, such as eHealth and telecare, both globally and locally.

Keywords	nursing, ICT, competence

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Tämän opinnäytetyön tarkoituksena on kuvailla minkälaisia pätevyyttä tieto- ja viestintäteknologian (TVT) käyttö hoitotyössä vaatii sairaanhoitajilta.

Aineisto tähän opinnäytetyöhön kerättiin systemaattisena tietokantahakuna käyttäen CINAHL ja MEDLINE tietokantoja. Yhdeksän tutkimusta, jotka täyttivät kriteerit, tarkistettiin ja analysoitiin käyttäen deduktiivisen sisältönanalyysin periaatteita ja pätevyys-määritelmään perustuvaa luokittelu matriisia. Luokat, jotka kuvasivat yleistä pätevyyttä olivat: tiedot, taidot, asenteet ja henkilökohtaisia taipumukset.

Tämän opinnäytetyön tuloksena on kuvaus tieto- ja viestintäteknologiaan (TVT) perustuvasta pätevyydestä. Taidot ja tiedot luokkiin kuuluu neljä alaluokkaa joista tietotekniset taidot ja koulutus ja kehittäminen ovat keskeisiä. Asenne ja henkilökohtaiset taipumukset luokkiin sisältyy viisi alaluokkaa keskeiseen toimivaltaan, positiiviseen asenteeseen ja kiinnostukseen.

Pätevä hoitotyö TVTn avulla vaatii monipuolista taitoja ja tietoa sekä riittävästi asennetta ja henkilökohtaisia taipumuksia. Monipuolista koulutusta olisi järjestettävä sairaanhoitajille ja hoitotyön opiskelijoille auttamaan heitä saavuttamaan kompetenssia tällä alalla. Lisätutkimukset voivat määrittää mitä osaamista ja sen monimuotoisuutta tarvitaan erilaisten digitaalisten teknologioiden, kuten e-Terveyden ja etähoidon, hyödyntämiseen hoitotyössä niim maailmanlaajuisesti sekä paikallisesti.

Avainsanat	tieto- ja viestintäteknologia, pätevyys, hoitotyö

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1 Introduction

"In this age of technology, where you can simulate or manipulate anything, how do we retain that human element?" Dave Grohl

The purpose of this literature review is to explore the scope of competence necessary for the use of information and communication technology (ICT) in nursing care. The study question of what competence is required from nurses for the use of information and communication technology (ICT) in nursing care is its main reference point. This final project is a part of the background work for the research project of Technology and its Ethics in Åbo Akademi University (Korhonen et al. 2014).

The usage of ICT has steadily increased in all life spheres, including economic, social, political and cultural (OECD 2009: 13-14), as well as health care, caring science and nursing. The gradual introduction and further extensive utilization of such technological inventions as personal computer, cell phone and Internet has impacted every aspect of life (OECD 2009: 13-14), making it unimaginable to provide services or even function without them. In the health care sector, especially with the recent general shift to outpatient care, ICT usage has become essential in decentralized health care provision (Thomassen & Jansen 2013: 58). However, since the introduction of digital technology into health care, nurses have been often in opposition, claiming that use of computerized systems prevents them from capturing "the real nursing" (Darbyshire 2004), distances nurses from patients (O'Keefe-McCarthy 2009: 794) and disrupts the rapport (Adams et al. 2007). Multiple technical problems also negatively affect the acceptance of new technologies. One reason for this might be that the ICT based systems used in health care are seldom designed with nurses' active participation and thus it may seem that the nurses are serving the system, not the system serves the nurses' needs.

In the digital era, when ICT rapidly starts to dominate every aspect of life, the question is not whether to transfer nursing practice to the digital world to meet the patients' needs as well as economic constraints and demands. The question is how to do it. How do we provide high quality nursing care in the digital world? How do we assure our patients that they interact with another human being, not with a machine? How do we retain that human element?

2 Information and communication technology (ICT) in nursing

Information and communication technology (ICT) is a fairly new concept and even though numerous researches have been contributed to examining the usage of ICT in nursing, the concept itself has not been thoroughly analysed and defined in literature. There is also no clear differentiation between ICT and related terms such as e-health or tele-health. In order to examine the nurses' competence required for ICT use, health care ICT as a concept is analyzed.

Concept analysis is an examination and description of the basic elements of a word or term that helps defining the concept and differentiating it from similar concepts (Walker & Avant 2011: 158). It is necessary particularly in the case of vague or overused terms such as ICT. The aim of this analysis is to develop an operational definition for the purposes of this final project and distinguish the term ICT from related terms such as e-health. This analysis follows the steps suggested by Walker and Avant (2011) and starts with the definitions and uses of the term in literature of different fields and professions, not limited to nursing. Subsequently, the defining attributes are determined and a model case is identified. Moreover, other exemplars from nursing profession are provided to describe the relation between ICT and related terms. Finally, health care ICT empirical referents are presented.

2.1 Definitions and uses of the term in literature

Information and communication technology (ICT) is a term developed in the context of information technology, informatics and computers field. However, its use is not limited to those fields, as ICT has been widely adopted in other spheres of life. Cambridge Dictionary of Business English (2013) defines ICT as "the use of computers and other electronic equipment and systems to collect, store, use, and send data electronically". In the context of education, Blurton (1999: 1) defines ICT as "a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." According to The Organisation for Economic Co-operation and Development (OECD) "ICT products must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display" (OECD 2009: 18). Moreover, OECD determines that "ICT has three

components: information technology equipment (computers and related hardware); communications equipment; and software" (OECD 2011: 188).

2.2 Attributes of health care ICT

In concept analysis, attributes are listed in order to demonstrate the characteristics most frequently connected to the particular concept and to enable differentiating the concept from other related terms (Walker & Avant 2011: 162). The following defining attributes of health care ICT used in clinical practice were identified: enabling digital data and information management including accumulating, retrieving, controlling, accepting, manipulating and sharing of data; as well as enabling communication (Bembridge et al. 2011; Wallis 2012: 14) of health care professional with patient/client (Andersen & Jansen 2013: 59) or other health care professional (Lewis et al. 2012: 334; Varpio et al. 2009:680).

Various authors list devices that do not fulfill these criteria into the group of ICT. For the purpose of this final project both characteristics mentioned above have to be present in order to include the device, technology or infrastructure to the ICT category.

2.3 Model case

A model case is described in the concept analysis to present the exemplary use of the concept with all its defining attributes present (Walker & Avant 2011: 163). Health care ICT model case is presented in the research article of Nilsson et al. (2010) in a form of Rexnet application. This application uses computer program and mobile phones with an Internet access to enable communication between nurses and patients. Via Rexnet nurses have access to "virtual rooms" and can communicate with patients through text messages. Receiving the messages enables data retrieval and collection by the nurse and data communication by the patient. Rexnet also allows the nurse to communicate with the patient by sending them text messages. (Nilsson et al. 2010: 261.)

2.4 Additional cases

Presenting additional cases helps in defining the concept itself and differentiating it from related concepts and terms. Additional cases can be a borderline case - an exemplar

that presents most but not all of the defining attributes; related case - exemplar presenting connected terms and concepts that helps in placing the analyzed concept in a wider context; and contrary case - an exemplar that clearly presents what is “not the concept”. (Walker & Avant 2011: 163.)

An example of a borderline case can be found in the research article by Engström et al. (2009). The authors list different ICT devices used in dementia care. Among them are tools used for monitoring and alarming such as passage alarms, fall detectors or sensor-activated night-time lights (Engström et al. 2009: 782). Those devices allow nurses to retrieve and accept the data about the location and movements of the patient. However, they do not enable the communication between the nurses and the patients or other health care professionals. Thus, only one of the attributes is present.

Related cases to ICT are terms such as electronic health (e-health) and telecare. Sometimes various authors (e.g. While & Dewsbury 2011) use those terms interchangeably. However, according to European Commission e-health is defined as “application of information and communication technologies (ICT) across the entire range of functions that affect the healthcare sector” (Commission of the European Communities 2004: 4). This suggests that ICT, while playing a central role, is only a tool of e-health without which existence of e-health would not be possible. However, ICT cannot be synonymous with e-health as it is a tool used also in other fields for example in e-commerce, e-banking, e-government; and in everyday life for instance in a form of social media. Similarly, telecare and its variations such as telemedicine, telenursing, teleconsultation etc. use ICT as a tool. Moreover, telecare itself is one of the media for provision of e-health.

When considering contrary cases, it is important to note that even though usage of technology is integral to nursing in modern world, not every digital device is an ICT device. Such equipment as pulseoximeters, electronic blood pressure meters, thermometers, X-ray machines etc. are all technology-enabled but are not information and communication technology devices. The single digital device is not an ICT item as long as it is not connected to the hardware and software that would enable data management and communication. (Bath 2010:7; Lewis et al. 2012: 333.)

2.5 Empirical referents

Empirical referents “are classes or categories of actual phenomena that by their existence or presence demonstrate the occurrence of the concept itself” (Walker & Avant 2011:168). They enable the recognition and measurement of characteristics of the concept (Walker & Avant 2011: 168). In the context of nursing practice, empirical referents of ICT include the software solutions and devices used in health care. These could be communication networks and software, including Internet and intranet, voice over internet protocol (VoIP), text messaging (short message service - SMS and multimedia messaging service - MMS) or video conference. (Bakken et al. 2010: 229; Lewis et al. 2012: 333). ICT devices utilized by nurses could be point of care devices such as personal digital assistants, phones, especially smartphones and cell phones, computers and tablet computers (Bakken et al. 2010: 229; Lewis et al. 2012: 333).

In this final project ICT stands for the technology that enables digital communication of health care professional with patient/client.

3 Competence in nursing

Competence as generally defined in Oxford Advance Learner’s Dictionary (2000) is “the ability to do [something] well” or together with its less frequent version competency “a skill that you need in a particular job or for a particular task”. Those definitions stress the importance of skills in the process of gaining competence. However, competence in nursing is hardly limited to skills. Many nurse researchers and theorists, with Peplau (1988) at the frontline, underline the humanistic side to nursing and the need to find balance between science and art as a core of nursing practice. Peplau states clearly that “the most useful nursing services for people can only be achieved if both the art and the science of nursing are retained, fully developed, and used in nursing practice” (1988: 13). The artistic aspect encompasses skills, personal ideals, values and attitudes while the science is synonymous with nursing knowledge (Peplau 1988). Therefore, the humanistic aspect of nursing plays a considerable role in the construct of nursing competence, even though it is easier to measure and value the technical aspects of professional performance (Cowan et al.2007: 25). This combination of art and science as well as the wide scope of nursing contributes to the notion that competence has become an “elusive

term" for various researchers (Axley 2008: 218; Cowan et al. 2007: 25; Garside & Nhemachena 2013: 541; Scott Tilley 2008: 58).Nevertheless, nursing organizations and researchers try to define competence in order to develop a certain standard for the delivery of nursing care.

In the United States, The National Council of State Boards of Nursing (NCSBN) in 1996 defined competence as "the application of knowledge and the interpersonal, decision-making and psychomotor skills expected for the practice role, within the context of public health" (2005). Australian Nursing and Midwifery Council (ANMC 2006) state that competence is "the combination of skills, knowledge, attitudes, values and abilities that underpin effective and/ or superior performance in a profession/occupational area". According to Nursing and Midwifery Council (NMC 2010: 7) based in United Kingdom, competence comprises of "the knowledge, skills and attitudes". Royal College of Nursing (2011) states that competency is "the ability to demonstrate the application of knowledge, understanding, practical and thinking skills to achieve effective performance in a professional or occupational role". The above mentioned sources stress the importance of the combination of skills, knowledge and attitudes, while paying less attention to the humanistic aspect of nursing practice. Moreover, a closer review of the cited sources reveals another issue that make the concept of "competence" so elusive.

The use of the words "competence" and "competency" is neither consistent nor clearly defined in nursing literature. Even though some sources distinguish between those two terms, the nursing literature uses both interchangeably even in the same text, as seen in Axley (2008), Lenburg (1999) or Scott Tilley (2008), regardless of British or American English variety. Moreover, some authors assign those words different meanings. Nolan defines competency as "an individual's actual performance in a particular situation" while competence is "an individual's capacity to perform his or her job functions whether in fact he or she has the knowledge, skills, behaviors and personal characteristics necessary to function well in a particular situation" (1998: 27). Another approach in distinguishing between competence and competency is presented by McMullan et al. (2003: 285) where competence is "job-related, being a description of an action, behaviour or outcome that a person should demonstrate in their performance" and competency is "person-orientated, referring to the person's underlying characteristics and qualities that lead to an effective and/or superior performance in a job". Those definitions address both art and science aspect of nursing, though not in a consistent way. Correspondingly, Axley (2008: 218) notes that competence attributes include "attitude, motives, personal insightfulness,

interpretive ability, receptivity, maturity, and self-assessment" and Cowan et al. (2007: 21) list additionally personal interests, perceptiveness, and aspects of personal identity.

Those various descriptions present how multifaceted, complex and elusive the concept of nursing competence might seem. However, the development of a working definition of competence is necessary to create a standard for improving education and assessing nurses' abilities to provide safe quality care. In the quest for holistic, standardized definition Cowan et al. (2007: 26) reviewed the literature and concluded that competence can be described as "a complex combination of knowledge, performance, skills, values and attitudes". This summarizes well the attributes mentioned in the definitions above as well as overlaps with RCN's definition of nursing as "intellectual, physical, emotional and moral process" (2003: 3). Based on that, the competence in this final project is defined as application of knowledge, skills, attitude and personal predispositions in nurse's professional performance.

It is important to remember, that nursing competence is context and time specific (Garside & Nhemachena 2011: 544). As the technology evolves, new competence is necessary to fulfill the nursing mission. Competence in general information and communication technology (ICT) usage are routinely required from nurses (Lenburg et al. 2011: 291; NMC 2010: 15) as part of communication competence. The report developed by The Technology Informatics Guiding Education Reform (TIGER 2009) Initiative describes the minimum set of competence regarding the use of health information technology in nursing. It clearly details the technical skills and knowledge with respect to basic computer competency, information literacy and information management. However, the attitudes or personal characteristics that are the components of competence are omitted in this report, as in many other studies regarding technology use in caring. Locsin and Purnell (2009: 424) underline that in the context of utilization of ICT competence must involve such aspects as intentionality, confidence and compassion. Therefore, this project mainly focuses on exploring the attitudes and personal predispositions required in the utilization of ICT in nursing care, even though it also includes the description of skills and knowledge.

4 Purpose, aim and study question

The purpose of this literature review is to explore the scope of competence necessary for the use of information and communication technology (ICT) in nursing care. The aim of this final project is to improve the knowledge regarding the required competence in ICT in caring. The study question guiding this final project is: “What competence is required from nurses for the use of information and communication technology (ICT) in nursing care?”.

5 Methods

The research method used in this final project is a literature review. This qualitative approach “gives the reviewer an appreciation of how research and knowledge in a particular field have developed and changed over time” (Tashiro & Holzemer 2010 :72). As a research tool, literature review is “an interpretation and synthesis of published research” (Murray 2002: 101 after Merriam 1988: 6). The steps followed in this final project, necessary to perform the literature review, as suggested by Tashiro and Holzemer (2010: 72) are to plan the process and identify keywords; to select databases and search engines; to systematically read the published literature retrieved through database search; to critique the retrieved research and to synthesize and write the literature review.

Even though literature review has well-structured phases to be followed, qualitative research in general is characterized by its lack of clear linearity. In the phase of systematic reading and critiquing the articles, the deductive content analysis has been chosen as a data analysis method.

5.1 Data collection

The preliminary literature database searches were performed in the winter of 2013 with such keywords as competence, ICT, nurse, caring, skills, smartphone and mobile phone in CINAHL and Medline databases. In the spring of 2014 the relevant literature has been retrieved through a database search using the keywords: ICT or “Information and Communication Technology” and Nursing or Caring. The databases selected for the final search were Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Medline. The search resulted in the total of 169 articles, including 39 duplicates. Basing

on the relevance of title and abstract 22 articles were chosen for further selection process. The detailed numbers of search hits are presented in the table 1.

Table 1. Database searches performed on 22.1.2014

Key words				
(ICT or "Information and Communication Technology") and (Nursing or Caring)	No. of hits	No. of relevant articles based on title	No. of relevant articles based on abstract	No. of articles chosen for analysis
Cinahl (Ebsco)	75	27	16	6
Medline (Ovid)	94 (39 duplicates with Cinahl)	29 (19 duplicates)	6	3
		In total:	22	9

The further selection process was based on a number of criteria that the article had to fulfill. ICT is a new term in nursing, thus no time limiters were used in order to retrieve up-to-date literature. Moreover, the preliminary search resulted in no similar literature review thus suggesting the need for the summary of the topic regarding competence in ICT use in nursing. To be included in the review, the article had to fulfill the following inclusion criteria: it had to be a research article; the examined ICT was used for communication between nurses and patients; the article provided an answer to the study question. As a result of this process 9 articles were selected for this review. The flow chart in the Appendix 1 presents the selection process of the articles to be reviewed.

ICT usage in nursing is a part of a broad concept of information technology and information management. This literature review focuses only on the competence related to the utilization of ICT for patient communication. It does not include competence necessary for general information management in nursing. Although ICT skills are necessary for evidence-based nursing, this also is not this project's topic.

5.2 Data analysis

The data analysis is performed by applying the principles of content analysis method as described by Elo and Kyngäs (2008). Content analysis is used in nursing research to analyze various forms of communication such as written, verbal or visual messages (Elo & Kyngäs 2008: 107 after Cole 1988). It aims to search for the existing patterns in the collected data (Maltby et al. 2010: 145). Even though qualitative, this method follows

systematic and objective steps, and is well-established and frequently used by nurse researchers (Elo & Kyngäs 2008: 108).

Content analysis as a data analysis method was chosen basing on the quality of the selected literature. The level of how directly the article answered the study question varied. Consequently, exploring the scope of competence in the use of ICT required analyzing indirect messages and hidden meanings in the selected articles, even though such approach may seem debatable due to its interpretative character and thus subjectivity (Elo & Kyngäs 2008: 109).

The data has been analyzed using the deductive approach to content analysis. This method is used to retest the data on the basis of previous knowledge or in a new context (Elo & Kyngäs 2008: 109, 111). In this case, the theoretical basis is provided by the definition of competence as "application of knowledge, skills, behaviors and personal predispositions in nurse's professional performance". The process of deductive analysis applied in this final project is based on the model presented by Elo and Kyngäs (2008) and is pictured in the Appendix 2. The main phases of this process are: preparation, organizing and reporting. In the preparation phase, the articles were read multiple times, keeping in mind the study question. The feeling of familiarity and the immersion in the data was developed in order to make sense of the whole data set (Elo & Kyngäs 2008: 109). Through this process the section of results of the reviewed articles was also chosen as material for deductive analysis as it was enough to achieve the data saturation. In the organizing phase, a categorization matrix was developed and data were coded according to the categories (Elo & Kyngäs 2008: 111). The categorization matrix in this final project is based on the definition of competence and is presented in the table 2.

Table 2. Categorization matrix

	Skills	Knowledge	Attitude	Personal predispositions
What competence is required from nurses for the use of (ICT) in nursing care?				

The data deriving from the Results section of selected articles were then reviewed for content and coded. Only the expressions that fit the categories from the above presented matrix were extracted from the data in order to precisely describe the scope of competence required for the use of ICT in caring. Following the initial coding, the data in each

category was analyzed and grouped into subcategories. The examples of coding and creating subcategories are presented in Appendix 3. In the third phase the results are reported according to the categories.

6 Results

The details regarding the articles including purpose, participants, methods, and results are presented in the Appendix 4. Out of nine reviewed research articles there were three qualitative studies, four studies that used mixed methods and two futuristic studies. Only two studies were based out of Europe - in Australia. Among the remaining seven, one was performed in United Kingdom, three in Sweden and three in Finland. Six studies were designed to research the perspective of health care professionals only, while the remaining three included also clients' point of view. In total approximately 219 health care professionals were included in the studies. Their age ranged from 25 (reported by Engström et al. 2009) to 58 (reported by Kouri et al. 2005). There is little information about the language skills of the participants. Only the article by Gund et al. (2013) reports families were excluded if they had inadequate knowledge of Swedish language.

The data was categorized according to the matrix presented in the table 2. In each category, subcategories emerged, as described in table 3. The examples of coding and further categorization of the expressions are presented in Appendix 3.

Table 3. Results based on the categorization matrix

	Skills	Knowledge	Attitude	Personal predispositions
What competence is required from nurses for the use of (ICT) in nursing care?	• IT skills • work routines • communication skills • skills to assess suitability	• IT literacy • legal issues • nursing interventions • training and development	• positive attitude • trust • willingness to change and develop • acceptance of ICT as part of practice • need for ICT	• interest • time management • professional relationship with clients • group behaviour • personal characteristics

There are four subcategories in the skills and knowledge categories and five subcategories in attitude and personal predisposition categories. The categories of attitude and personal predispositions received the highest number of attention in all the analyzed material, while skills and knowledge received slightly less attention.

6.1 Skills

Nursing skills required for competent use of ICT include IT (information technology) skills, work routines, communication skills and skills to assess the suitability. The subcategory of IT skills consisted of most specific descriptions, mentioned in six articles. IT skills refer to the technical abilities to use the computer and other ICT devices and applications. The computer skills include starting up the computer, accessing the Internet, logging in to a Web site logging off from a Web site, accessing the computer-based applications and locating the information on the computer (Courtney-Pratt et al. 2012 :616; Dowding 2013: 34; Kouri et al. 2005: 181). Dowding (2013: 33) calls them “basic IT skills” while Kouri et al. (2005:181) refers to “sufficient computer skills”. In regards to application and devices, Nilsson et al. (2009:263) refer to the skills of “using the ICT application”. Those skills include accessing the applications like Skype (Gund et al. 2013), Outlook Express (Dowding 2013: 34) or Rexnet (Nilsson et al. 2009: 263), reading and sending the messages (Nilsson et al. 2009:263; Gund et al. 2013: 9; Jauhiainen et al. 2006: 427) and utilizing data collection functions (Gund et al. 2013: 9; Courtney-Pratt et al. 2012: 616).

Competent use of ICT requires from nurses the skill to incorporate ICT in their working routines. Nilsson et al. (2009: 263) observe that the mobile phone application enables nurses to write messages wherever they are thus not binding them to one specific working environment. This requires adopting new working routines (Kouri et al. 2005: 181) and might be challenging for many nurses (Meristö et al. 2009: 147).

Communication skills are vaguely implied in the reviewed articles. Dowding (2013: 34) states the requirement for “excellent verbal, written, and IT communication skills” but she does not specify what IT communication actually means. According to Kouri et al. (2005: 185), the use of ICT requires from nurses the ability to “function as a ‘go-between’”, meaning that the nurses should be able to take into account the information available digitally to the clients/users to communicate with them. The issue of verbal versus non-verbal communication is discussed by Gund et al (2013) as their study involved both text-based ICT application and video-based Skype. According to the clients, being able to see the nurse improves communication (Gund et al. 2013: 7).

The remaining skill identified through the review is the ability to assess the suitability of the ICT for particular patient (Egström et al. 2009: 786). The same application and device, even if designed for a specific target group, might not be adequate for each patient of this group. The nurse has to have the skill to assess whether the usage of the particular ICT is feasible.

6.2 Knowledge

The category of knowledge required from nurses for competent use of ICT consists of such subcategories as training and development, nursing interventions, legal issues and IT literacy. In order to achieve competence nurses should undergo sufficient training in ICT applications and devices (Jauhiainen et al. 2006: 428; Loh et al. 2009: 412). This requires time and resources (Egström et al. 2009: 786; Kouri et al. 2005: 183) as well as personal, versatile training options (Kouri et al. 2005: 181, 183) and support (Nilsson et al. 2009: 263). Additionally, nurses could be involved in projects developing ICT (Kouri et al. 2005: 184).

Competent use of ICT requires from nurses also knowledge about nursing interventions. These could include general knowledge about drug management, physical symptoms of various disorders or organizing home care (Nilsson et al. 2009: 262). The knowledge is also specific to the field of work, for example in maternity care it might include knowledge about the equipment for child care (Gund et al 2013: 8). The usage of ICT requires updating the knowledge as introduction of new technologies may lead to inclusion of a wider range of clients than face to face contact. Kouri et al. (2005: 185) notice that in maternity care facilitated by ICT, nurses had to “update their knowledge, in order to include fathers more individually than before”. Moreover, the nurses need to learn that ICT is not “an independent thinking system” but a tool or an aid in their practice (Kouri et al. 2005: 184) and thus it does not excuse from having sufficient nursing knowledge.

Nurses should be knowledgeable about legal issues concerning nursing practice and ICT utilization. These include privacy protection (Kouri et al. 2005: 181), confidentiality, data security (Dowding 2013: 34) and security procedures (Loh et al. 2009: 412). Additionally, the legal limitations of responding to ICT facilitated information and advice (Loh et al. 2009:412) should be clear and known to nurses.

The subcategory of IT literacy is less detailed and defined as the previously mentioned subcategory of IT skills. IT literacy seems to be a vague expression (Dowding 2013: 33) that includes general knowledge about computers and ICT (Egström et al. 2009: 786; Kouri et al. 2005:181). It also encompasses the knowledge to recognize junk mail and wrongly addressed e-mails (Egström et al. 2009: 786).

6.3 Attitude

The category of attitude consists of five subcategories: positive attitude, trust, willingness to change and develop, acceptance of ICT as part of practice and need for ICT. The need for positive attitude is expressed by authors directly (Egström et al. 2009: 785; Jauhiainen et al. 2006: 427; Kouri et al. 2005: 181) or indirectly by mentioning "negative attitude" as a hindering factor (Gund et al. 2013: 9; Kouri et al. 2005: 181). The positive attitude is also expressed as enthusiasm towards ICT (Gund et al. 2013: 9) and positive experience (Egström et al. 2009: 785; Nilsson et al. 2009: 262).

To utilize ICT competently nurses also need the trust. Firstly, the nurses should trust the ICT and technology in general (Courtney-Pratt et al. 2012: 611; Egström et al. 2009: 785; Kouri et al. 2005: 181). Secondly, the trust in utility of the interventions delivered through ICT is required from nurses (Courtney-Pratt et al. 2012: 616). Lastly, the nurses need to trust what the clients report through ICT as it is not possible to instantly, visually verify the reported information (Courtney-Pratt et al. 2012: 616).

ICT as a new tool in nursing practice requires from nurses the willingness to change and develop. “A desire to change” (Egström et al. 2009: 784) or at least a general acceptance that changes are inevitable in the process of practice and personal development (Kouri et al. 2005: 182, 183) are a part of nursing competence. In the context of ICT, Gund et al. (2013: 9) note the importance of health care and thus nursing care keeping up with the technological development in the society.

Accepting the ICT as part of nursing practice, working routines (Kouri et al. 2005: 184), and as an aid in daily work (Nilsson et al. 2009: 262) is one of the components of competence. It requires from nurses reconsidering their regular working habits and ICT’s applicability in the context of everyday tasks (Kouri et al. 2005: 183) as well as recognizing the possibility of teleworking as part of nursing (Kouri et al. 2005: 181). Accepting

ICT does not mean replacing health care professionals with technology as problem assessment and client guidance will remain the nurses' role (Kouri et al. 2005: 184). However, the nurses would need to accept the new method of assessment that is based on technology, not on visual clues observed during face-to-face contact with the patient (Courtney-Pratt et al. 2012: 616).

Furthermore, to achieve competence in ICT use in caring, nurses should perceive the need for ICT (Egström et al. 2009: 785). They should acknowledge the advantages, possibilities and improvements brought by the use of technology (Egström et al. 2009: 784,785).

6.4 Personal predispositions

The category of personal predispositions required for competent use of ICT in caring includes interest, professional relationship with clients, time management, group behaviour, and personal characteristics. Genuine interest in new technologies and computers (Egström et al. 2009: 785; Kouri et al. 2005: 181) in particular in communicating with patients via ICT like e-mail (Egström et al. 2009: 785) or Skype (Gund et al. 2013: 9) seems to be an important factor in developing competence. This interest is particularly necessary when there is a need to familiarize oneself with the wide variety of applications and devices and to keep up with the constant development of ICTs (Meristö et al. 2009:147). Additionally, this interest extends to general interest in development of nursing practice and "finding new possibilities" in patient care (Gund et al. 2013: 8-9).

Use of time can be very personal for the individuals, even though time management strategies can be learnt. Competent care delivered through ICT requires the ability to organize time (Nilsson et al. 2009: 262), especially in order to facilitate timing of the responses adjusted to clients' needs and demands (Gund et al. 2013: 6; Kouri et al. 2005: 183).

Group behaviour, for example the type of roles individuals take in a team, is related to personal predispositions. In order to provide quality care via ICT, the group members must support each other (Kouri et al. 2005: 183). The atmosphere created by co-workers should facilitate open communication about lack of ICT skills (Kouri et al. 2005: 181) and equality between all health care professionals regardless whether the method of care delivery is direct or ICT-mediated (Courtney-Pratt et al. 2012: 617).

Three personal characteristics necessary for competent care via ICT are identified through this review. These are confidence (Courtney-Pratt et al. 2012: 617), motivation (Gund et al. 2013: 9) and commitment (Courtney-Pratt et al. 2012: 617).

Building a client-nurse relationship is part of nursing competence and can be interpreted as dependent on personal predispositions. There seems to be a concern about retaining human contact in technology mediated communication (Egström et al. 2009: 785; Loh et al. 2009: 412). It puts the nurses in a position of fear that ICT would deprive them from personal relationship with clients (Gund et al. 2013: 9). This fear should be overcome in order to maintain the professional relation. The use of ICT that leads to physical distance between nurses and clients demands also that the health care professionals find the balance between maintaining their authority and satisfying the clients' needs (Meristö et al. 2009: 147). It also requires that the nurse respects the patient's choice of health care delivery method, whether it is traditional face-to-face contact or ICT-mediated care (Jauhiainen et al. 2006: 428).

7 Discussion

7.1 Summary and discussion of main findings

Retaining human contact and delivery of quality care with the use of ICT requires diverse utilization of nursing competence. Its scope, as presented in Table 2, covers almost equally the areas of skills and knowledge as well as attitude and personal predispositions. This would suggest that competent use of ICT in patient care delivery demands competence from all those areas. Even though category of attitude and personal predispositions each consist of more subcategories than skills and knowledge, those two last categories have been described in more detail in the reviewed articles. However, for each category there was one main subcategory that was the most distinguishable among others.

IT skills seem to be a leading subcategory of the skills area of competence. The basic abilities to use the ICT devices and applications are considered a key for care provision with the use of communication technologies. This is well reflected in nursing guidelines,

standards and reports such as TIGER report (2009) where technical skills of computer usage are minutely described. This presents that even if the scope of IT skills may vary depending on the devices and applications used, defining such skills is relatively straightforward and comparable to an instruction manual. Nevertheless, skills area of competence in ICT use requires more than just IT skills. Incorporating new approaches and interventions into working routines, communication skills and skills to assess the suitability all belong to basic nursing skills. ICT only brings new meaning and new context to these.

ICT provides also new context to nursing interventions. While in direct face-to-face contact most of the clinical interventions are equal to clinical skills, the remote nursing gives emphasis to patient education and thus to theoretical knowledge about the interventions. Moreover, in the category of knowledge the competence of training and development stands out. That suggests that receiving additional ICT oriented training is necessary from the nursing point of view to deliver quality care. Garside and Nhemachena (2011: 544) state that competence is context and time specific which consequently means that also the training should be tailored to meet the specific demands of ICT usage. The ICT training should encompass previously mentioned skills as well as such topics as legal issues in ICT use and IT literacy. Cowan et al. (2007: 25) remind that those technical aspects are easier to measure and value and thus easier to teach and learn. However, the training should encompass more than just skills and knowledge. Basic nursing education and training in regards to ICT use should also aim to develop attitudes and personal predispositions, as these are inseparable constituents of nursing competence.

Positive attitude seems to be a key attitude for competent provision of nursing care through ICT. Previous researches prove that nurses have negative attitude towards technology. O'Keefe-McCarthy (2009: 794) concludes that technology distances nurses from patients while Adams et al. (2007) state that it disrupts the rapport. Positive attitude towards ICT based care might aid in overcoming those challenges. Moreover, it supports the acquisition of various competence required from nurses, not only those directly related to technology. Similarly to the area of skills, attitude encompasses general competence, such as willingness to change and develop the profession and oneself, acceptance of new methods and interventions as part of practice and trust. The use of ICT may facilitate the shift in nurse-patient relationship from medical to patient empowerment as visual verification of what patient reports is limited and thus making the patient equally responsible in the care process. However, this requires adequate attitude from nurses.

Competent use of ICT might not be provided without suitable personal predispositions, of which the most important seems to be interest. Correspondingly to other areas of competence, interest and other predispositions are not limited to technologies but they relate also to general nursing competence. Such competence as group behaviour, time management and developing professional relationship with patients/clients are challenged by introducing ICT based care and thus should be supported by adequate training. Additionally, a personal characteristic of confidence seems to play an important role in competent care as is noticed also by Locsin and Purnell (2009: 424). Moreover, ICT based care might require intentionality and compassion (Locsin & Purnell 2009: 424) as well as motivation and commitment.

Most of the above mentioned competence are already included in nursing curricula and establish basis for nursing profession. However, the utilization of ICT in care delivery requires flexibility in using the previously acquired competence and applying it actively in the new context. Consequently, with additional training in ICT skills, high quality nursing care can be ensured.

7.2 Validity

Various aspects of this final project process add to its validity and trustworthiness, that is often an issue in qualitative research. Firstly, validity is ensured by the choice of databases that are well-established among the nurse researchers. Secondly, the clear study question was stated to which this final project answers. Usage of primary sources and consistency of the project add additional validity to the project. Another important factor is the transparency in the description of the content analysis, including the flowcharts and tables picturing the various stages of the process. (Elo and Kyngäs (2008: 112; Parahoo 2006: 145.)

The validity is limited by the time and resources, and by any bias coming from the fact that the researcher is at the same time a research tool in a qualitative research (Parahoo 2006: 410). In this project, implied data was taken into review which exposes the work to additional bias. Elo and Kyngäs (2008: 109) discuss the usage of indirect information and “hidden meanings” and conclude that it is acceptable as long as it is guided by the aim and study question. The Appendix 3 presents the examples of categorization that include both direct and implied data and gives verification to data analysis.

As the researcher is a research tool (Parahoo 2006: 410), also the categorization process is exposed to bias. The main categories were developed based on the competence definition and can be considered objective. However, assigning the meaning units to particular categories as well as grouping them into subcategories is more subjective. The subcategories are often interrelated and the differences between some of them are subtle. This concerns for example such subcategories as “work routines” and “time management” as well as “communication skills” and “professional relationship with clients”. Also assigning the subcategories to categories may be debatable, especially in the category of personal predispositions. However, the effort was made to justify those choices clearly, both in the text as well as the Appendix 3 with the categorization examples.

The results presented in this final project are transferable to Finland and Scandinavia as three of the nine analyzed studies were based in Finland and three in Sweden. Generalizing the results to Europe and world can be challenging and thus further research could be commenced to establish the scope of competence in ICT use in nursing care in global and local context.

7.3 Ethical consideration

Ethical aspects of the final project are also considered. No plagiarism, fabrication or falsification took place during writing of this review. There is no conflict of interest. The research has been performed by the author alone, supervised by experts. Such ethical principles as honesty, objectivity, integrity, carefulness, openness, respect for intellectual property, legality and non-discrimination (Holzemer 2010:167) as well as principles of responsible conduct of research presented by Finnish Advisory Board on Research Integrity (TENK 2012) were taken into consideration during the project work.

8 Conclusion and recommendations for nursing practice

The efficient utilization of ICT in care delivery requires from nurses versatile and flexible use of competence. All areas of nursing competence in ICT used in caring are interre-

lated and support each other. Personal predispositions are not sufficient without adequate IT skills; positive attitude is not sufficient without basic training and IT knowledge. Developing all those areas is necessary in order to provide high quality care and to retain the human element in technology based nursing.

Table 4. Areas of recommendations for competence development

Area of recommendations			
Nursing practice	Nursing training	Nursing management	Nursing research
Active and flexible usage of previously acquired nursing competence adjusted to ICT demands Positive attitude towards provision of humane ICT based care	Ensuring basic ICT training in nursing curricula Including the diversity of ICT related competence in non-ICT related courses Including all areas of competence in versatile, individualized training	Providing sufficient time and resources for versatile personnel training Providing sufficient and timely technical support Providing clear local guidelines that establish and facilitate ICT based care	Research regarding the scope of competence in the usage of e-Health and telecare in nursing globally and locally Research regarding patients' views on nursing competence in care provision with the use of technology

Table 4 suggests the actions that could be taken to ensure competent use of ICT in nursing care and means to further develop the ICT related competence.

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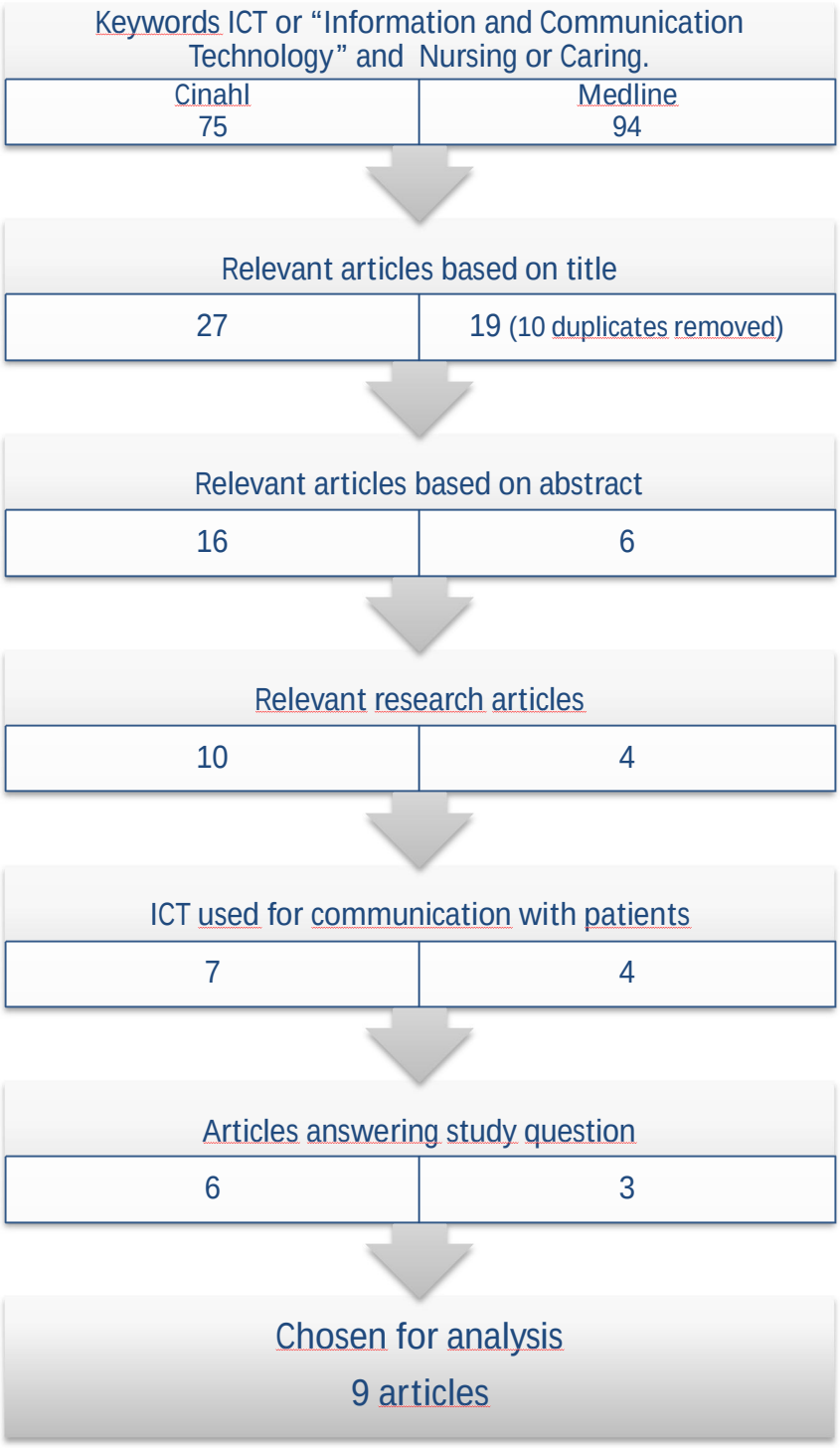
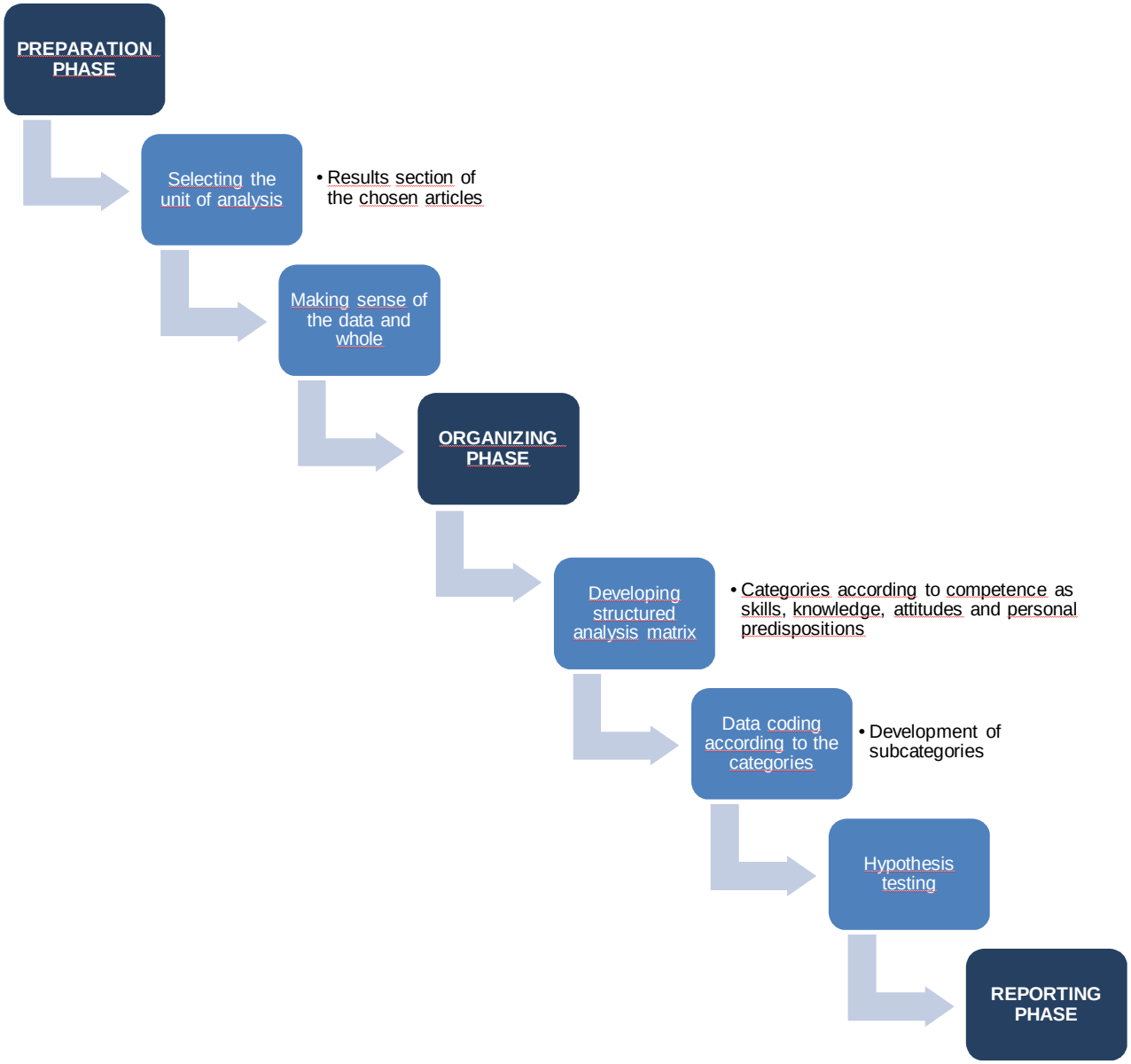
Appendix 1. Article Selection Process



Appendix 2. Process of Deductive Data Analysis



Appendix 3. The examples of coding and creating subcategories

Category	Expression		Subcategory
Skills	Locate information on the computer		IT skills
	They did not have sufficient computer skills		
	Read and send messages through the application forms or through dialogue box		
	It was difficult for them to adopt new working routines		Working routines
	Writing messages wherever you were		
	The launch of new electronic tools … requires new skills and working methods		
	Seeing the nurse improved communication		Communication skills
	Skills to function as a 'go-between' when evaluating the information found via the Net		
	ICT did not suit some residents' needs or that the ICT had negative effects and therefore they did not use it for these residents		Skills to assess suitability
Knowledge	A need for extensive, preferably personal, training in ICT		Training and development
	Basic education reinforces the professional foundation of knowledge		
	More involved in ICT development projects		
	They recognised that they did not know enough about ICT and its use		IT literacy
	Insufficient knowledge about computers		
	To be IT literate		
	Privacy protection issues		Legal issues
	Requirement for maintaining confidentiality and ensuring data security		
	Security procedures		

	The contacts included questions about medicines, physical problems and practical things		Nursing interventi-ons
	This challenges the professionals to updated their knowledge, in order to include fathers more individually than before during pregnancy		
Attitude	Having a positive wait-and-see attitude		Positive attitude
	Negative attitude		
	Enthusiastic about the possibility of using ICT in home health care		
	Acceptance of ICT as part of the working routines		Acceptance of ICT as part of practice
	We have this opinion that our work should be done at our workplace, and it cannot be done elswhere		
	ICT could be an aid in their work		
	Seeing the possibilities and a need for the ICT or parts of it		Need for ICT
	They perceived the need for the ICT		
	Trust in technology		Trust
	Distrustful attitude towards Net Clinic		
	Trusting the utility of telephone interventions		
	It is important that care keeps pace with the society's technological development		Willingness to change and de-velop
	Ready to accept this inevitable change		
	A desire to change		
Personal pre-dispositions	Not interested in e-mail communication		Interest
	Expressed an interest in using Skype for communication with families also outside of the study		
	I am interested in developing the care of the infants and in finding new possibilites		
	find the balance between keeping the clientele happy and maintaining the authority needed		

	Nurses will respect the patient's decision making regardless whether the patient choosed the traditional way of care or a modern way		Professional relationship with clients
	ICT was a threat to the personal relationship between the parents and the nurse		
	We need to find suitable times for clients to contact us over the net		Time management
	They has worked out routines, such as visiting the messaging program at fixed times, which organized the working situation		
	Support each other		Group behaviour
	They did not wish to reveal their lack of skills in a group		
	CHN mentors struggled to have their mentoring role recognized as legitimate work, with the same importance as the direct care delivered to other clients		
	Commitment		Personal characteristics
	I am struggling with my lack of motivation		
	Confidence to both deliver the intervention and build computer skills		

Appendix 4. Summary of the results of the literature review

Author(s), year, title and country where the study was conducted	Purpose	Participants (sample size)	Data collection and analysis	Main results	Competence
Courtney-Pratt, H., Cummings, E., Turner, P., Cameron-Tucker, H., Wood-Baker, R., Walters, E.H. and Robinson, A.L. (2012) "Entering a world of uncertainty: community nurses' engagement with information and communication technology" Australia	To describe how community health nurses utilize ICT tools to support self-management of COPD patients.	21 mentors that worked as community health nurses in 4 community health centers	Participatory research including a survey, 26 monthly action research meetings and semi-structured interviews.	The acceptance, utilization, and integration of ICT into nursing practice are affected by: environmental issues; factors in building capacity, confidence, and trust in the technology; and developing competence.	Skills - IT; Personal predispositions - group behaviour, personal characteristics; Attitude - trust, acceptance of ICT as part of practice
Dowding, D. (2013) "Are nurses expected to have information technology skills? " UK	To examine the incorporation of the basic ICT competencies into nursing job descriptions and person specifications.	A 10% random sample of 1379 (N=136) job descriptions and person specifications for various positions for nurses	Deductive analysis basing on core dimensions of the KSF, broad category headings used to analyze the job descriptions; independent coding of 20% of job descriptions checked if the coding was consistent.	84% of job descriptions mention necessity for IT skills and 26% specifies separately the requirement for ICT skills. 74% of job descriptions mentions the confidentiality and data security requirements.	Knowledge - legal issues, IT literacy; Skills - communication, IT
Engström, M., Lindqvist, R., Ljunggren, B. and Carlsson, M. (2009) "Staff members perceptions of a ICT support package in dementia care during the process of implementation" Sweden	To present the perceptions of staff members regarding the implementation of ICT support package in dementia care	14 staff members of a residential home for people with dementia	Qualitative content analysis of data obtained from 4 rounds of group interviews.	The research identified two types of perception of ICT: "moving from fear of losing control to perceived increase in control and security" and "struggling with insufficient/deficient systems.	Knowledge - IT literacy, training and development; Skills to assess suitability; Personal predispositions - interest, professional relationship with clients; Attitude - positive attitude, trust, willingness to change and develop, need for ICT

Gund, A., Sjoqvist, B.A., Wigert, H., Hentz, E., Lindecrantz, K. and Bry, K. (2013) "A Randomized Controlled Study About the Use of eHealth in the Home Health Care of Premature Infants" Sweden	To study the utilization of eHealth tools in the home care of premature infants	34 families with premature infant divided into 3 groups(standard home health care group, web application group and Skype group) and 6 home health care nurses	Quantitative data collected through questionnaires: in family questionnaires five-point Likert-like scale and yes/no/no opinion. Qualitative data collected through semi-structured individual interviews with 16 families at their homes and through free comments in the questionnaires, and discussion with nurses.	Most or all of the users of ICT applications found them easy to use, helpful and satisfying. The use of ICT helped them to feel more confident as parents of a premature infant.	Knowledge - nursing interventions; Skills - communication, IT; Personal predispositions - time management, interest, professional relationship with clients, personal characteristics; Attitude - positive attitude, willingness to change and develop
Jauhiainen, A., Saranto, K. and Tossavainen, K. (2006) "Consumer-centered nursing with ICT: A futuristic viewpoint" Finland	To present the opinions and possible scenarios regarding the utilization of ICT in nursing practice in the future.	Finnish expert panel - 81 participants - nurses, clinical nurse managers, nurse educators, professionals of development, research and information technology, and patients	Futuristic study using Delphi method. Data gathered and analyzed with qualitative and quantitative methods	Three main scenarios were identified concerning nursing knowledge management and development, patient orientation and self-care, and technology vs. human being.	Knowledge - training and development; Skills - IT; Personal predispositions - professional relationship with clients; Attitude - positive attitude
Kouri, P.,Turunen, H. and Palomäki, T. (2005) "'Maternity clinic on the Net service' and its introduction into practice: experiences of maternity-care professionals" Finland	To present the experiences, opportunities and obstacles in using a maternity care Internet-based tool by the health care professionals	5 midwives, 2 public health nurses and 3 doctors of 4 maternity facilities in Easter Finland	Content analysis of qualitative data obtained from semi-structured thematic interviews.	The research identified three groups of ICT users: doubters, accepters and future confidents. The introduction of ICT required consideration for two main issues: preserving confidentiality and adequate allocation of resources for equipment and time.	Knowledge - nursing interventions, legal issues, IT literacy, training and development; Skills - work routines, communication, IT; Personal predispositions - time management, group behaviour, interest; Attitude - positive attitude, trust, willingness to change and develop, acceptance of ICT as part of practice

Loh, P., Flicker, L. and Horner, B. (2009) "Attitudes toward information and communication technology (ICT) in residential aged care in Western Australia." Australia	To examine the reasons for failure in introducing the video conference consultations in residential aged care facilities.	13 nurses, 16 carers, 3 medical practitioners, 7 allied health professionals, 7 facility managers, 7 other related RACF staff members out of 160 care staff members; 4 focus groups with 8 staff members from hostel, 15 staff members from a combined hostel and nursing home; 9 staff members from a nursing home; and 12 residents of a hostel	Mixed methodology: semi structured interview groups and quantitative survey. Quantitative data analyzed with descriptive statistics in Microsoft Excel. Interpretive analysis for qualitative data.	There is an awareness of ICT in residential aged care facilities but the potential benefits for the clients are not identified. One of the concerns of both staff members and residents is the loss of human contact when using ICT.	Knowledge - legal issues, training and development; Personal predispositions - professional relationship with clients
Meristö, T., Tuohimaa, H., Leppimäki, S. and Laitinen, J. (2009) "Alternative futures of proactive tools for a citizen's own wellbeing" Finland	To form a basis for an empowered citizen vision where control over health and wellbeing aspects of life can be executed with ICT tools.	Three macro-scales scenarios	Futuristic approach using a scenario methodology	The research defined a role of a new ICT tool for citizens (COPER) and challenges for future nursing practice in different scenarios.	Skills - work routines; Personal predispositions - interest, professional relationship with clients
Nilsson, C., Skär, L. and Söderberg, S. (2009) "Swedish District Nurses' experiences on the use of information and communication technology for supporting people with serious chronic illness living at home - a case study" Sweden	To present the experiences of two District Nurses in utilization of ICT in home care for communication with chronically ill patients.	Two District Nurses from primary home health care	Thematic content analysis of qualitative data obtained through 3 rounds of semi-structured interviews.	The District Nurses experienced that ICT saved their time and enabled accessibility of care, closer communication and more trusting relationship with the patients.	Knowledge - nursing interventions, training and development; Skills - work routines, IT; Personal predispositions - time management, interest; Attitude - positive attitude, acceptance of ICT as part of practice