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MIDWIVES´ VIEW OF THE IPANA MATERNITY´S DIGITAL SOLUTIONS USABILITY

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THESIS
Abstract

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EHRs are part of the health care professionals´ daily tools. The PHPs make it possible for patients to be involved in the care. The challenges of the usability of the systems, from the professional end-user point of view, have been awakened. The objective was to map the midwives´ perceptions of the usability of the iPana Maternity system´s digital solutions. The purpose was to find out how the midwives evaluate the usability, which functions support the work, and what should be improved. Usability was examined through Jakob Nielsen's usability features.

The quantitative survey was done between 18.11.-6.12.2021, in the Pirkanmaa Hospital District. The questionnaire was sent to 100 TAUH delivery unit, pregnancy emergency, obstetric ward, and maternity policlinic midwives. The answer present was 37.

Features that supported the work of midwives were learning how to use the system, remembering the use, and finding information and terminology about efficiency features. The main improvement needs were about efficiency feature. These were performing routine tasks, integration, noticing abnormal values, and double documenting. This thesis provided an overview of the end-users' perceptions. Some of the results can be used directly in the development of the system. However, further research is needed to address usability challenges in greater depth.

CONTENTS

ABBREVIATIONS

CSAM	The Owner of the iPana EHR
EHR	Electronic Health Record
iPana EHR	iPana Electronic Health Record for the health care professional users
iPana Maternity Service PHP	iPana Patient Health Portal for the patient users, integrated into the iPana EHR
PHP	Patient Health Portal
TAUH	Tampere University Hospital (Pirkanmaa Hospital District)

1   INTRODUCTION TO THE EHRS´USABILITY AND ITS IMPACT ON THE WORK OF HEALTHCARE PROFESSIONALS

Health care professionals are working in a changing environment. The patient's active role as a data provider and participant in treatment has increased. (The Ministry of Social Affairs and Health 2020, 13.) One of the goals, of the digitalization guidelines of the Ministry of Social Affairs and Health for 2025, is for citizens to make information digitally available to the health professional (The Ministry of Social Affairs and Health 2016). The digital solutions in the electronic health records (EHR) support this change (The Ministry of Social Affairs and Health 2020, 13). Electronic health services are increasing and present in every nurse´s daily work (Ahonen, Kouri, Kinnunen, Junttila, Liljamo, Arifulla & Saranto 2016). The challenges of the EHR´s usability, from the professional end-user point of view, have been awakened nationally in Finland (Vehko, Hyppönen, Ryhänen & Heponiemi 2017). One of the objectives, of the digitalization guidelines of the Ministry of Social Affairs and Health for 2025, is to improve the information system´s usability (The Ministry of Social Affairs and Health 2016). The usability of an EHR affects the patient and the caregiver. Poor usability can, affect negatively the quality of care and cause errors that can harm the patient (Ratwani, Savage, Will, Fong, Karavite, Muthu, Rivera, Gibson, Asmonga, Moscovitch, Grundmeier & Rising 2018; Kaipio, Kuusisto, Hyppönen, Heponiemi & Lääveri 2020). From the professional user´s point of view, usability reduces work-related stress and increases well-being at work (Vehko et al. 2017; Vehko, Hyppönen, Puttonen, Kujala, Ketola, Tuukkanen, Aalto & Heponiemi 2019; Kaihlanen, Gluschkoff, Laukka & Heponiemi 2021.). In Finland, large surveys about the topic are done by the National Institute for Health and Welfare in the past years. (Vehko et al. 2017.) Finnish Institute of Health and Welfare project STePs 3.0 is now monitoring and evaluating social and health information system services in Finland (Finnish Institute for Health and Welfare 2020b).

The international study revealed that the EHRs, used by nurses, do not reach nursing clinical needs, and systems were not nursing-specific (Topaz, Ronquillo, Peltonen, Pruinelli, Sarmiento, Badger, Ali, Lewis, Georgsson, Jeon, Tayaben, Kuo, Islam, Sommer, Jung, Eller, Alhuwail & Lee 2016). The same kind of result came from the Finnish inquiry to nurses in the year 2020. Nurses felt that EHRs support work partly (Saranto, Kinnunen, Kyytsönen & Vehko 2020), although systems are one tool in daily work (Hyppönen, Lääveri, Hahtela, Suutarla, Sillanpää, Kinnunen, Ahonen, Rajalahti, Kaipio, Heponiemi & Saranto 2018a; Saranto et al. 2020). The usability of the EHRs should be monitored and the view of the health care professionals is crucial when developing the systems (Kaipio, Lääveri, Hyppönen, Vainiomäki, Reponen, Kushniruk, Borycki & Vänskä 2017; Hyppönen et al. 2018a; Vehko, Hyppönen, Ryhänen-Tompuri & Heponiemi 2019). This also includes the maintenance phase. No system is ever finally finished, in information technology, change is constant (Takki & Halonen 2017, 12). Digitalization is rapidly changing the world and creating new alternatives to old operations (The Ministry of Social Affairs and Health 2016).

This thesis is concentrating on the CSAM iPana EHR´s integrated system iPana Maternity Service PHP´s usability. The CSAM is an eHealth company, and the iPana EHR is one of their products

(CSAM 2020a). The iPana EHR is widely in use in Finland´s delivery units. It is in use in Pirkanmaa Hospital District, The Hospital District of Southwest Finland, the Northern Ostrobothnia Hospital district, the North Karelia Hospital District, the Vaasa Hospital District, and Lapland Hospital District. (Reponen, Keränen, Ruotanen, Tuovinen, Haverinen & Kangas 2021.) In the theory base, there is viewed research about EHR although this thesis is about the iPana Maternity PHP. This is because iPana Maternity PHP and data integration are only considered from the perspective of a professional user, midwife, and not from the patient's point of view. For a professional, EHR's integrated iPana Maternity PHP is part of the EHR. The usability of the iPana Maternity´s digital solutions can thus be viewed based on the same goals that can be used when evaluating the usability of EHR.

In this thesis, the midwife is a registered midwife in Finland in the Tampere University Hospital (TAUH) in the maternity policlinic, pregnancy emergency, obstetric ward, or the delivery unit. The midwife's professional qualifications are definite in the EU Directive 2005/36/EC (Directive 2005/36/EC, the recognition of professional qualifications).

2   MIDWIFERY WORK, IPANA MATERNITY´S DIGITAL SOLUTIONS, AND USABILITY OF EHRS

This section presents Finnish midwifery work from a digital perspective in a maternity policlinic, pregnancy emergency, obstetric ward, and delivery unit. The work of a midwife in these work units is described because these units were surveyed for the thesis. iPana Maternity's digital solutions, web-based preliminary information platform, electronic self-monitoring platform, and electronic maternity card are presented. EHR's usability is addressed by Jakob Nielsen's (1993) definition of usability. Nielsen's (1993) definition of usability is the core of this thesis.

2.1   Midwife in the maternity policlinic, pregnancy emergency, obstetric ward, and delivery unit

In Finland, maternity care is planned between primary health care and specialized care. Maternity clinics, in primary health care, are the basis of maternity care. (Tapanainen, Heikinheimo & Mäkikallio 2019.) Normal pregnancy monitoring happens in the maternity clinic (Paananen, Pietiläinen, Raussi-Lehto, Väyrynen & Äimälä 2006). The primary work in the maternity clinic is to identify pregnancy complications (Klemetti & Hakulinen-Viitanen 2013). Maternity clinics work closely with specialized care, birth hospitals. Maternity policlinics, obstetric ward, pregnancy emergency, and delivery units are responsible for maternity care services in specialized medical care (Finnish Institute for Health and Welfare 2021). Home births are rare in Finland (Tapanainen et al. 2019). In 2020, 99,4 % of all deliveries happened in the hospital (Finnish Institute for Health and Welfare 2020a).

In Finland in the maternity policlinics, the midwives work together with a doctor or independently (The Federation of Finnish Midwives 2017). A woman comes to the maternity policlinic with a referral for a planned appointment (Tapanainen et al. 2019).

The obstetric ward is for pregnant women who need long monitoring in the hospital (TAUH 2020a). In the ward, the midwife works together with other midwives, nurses, primary caregivers, and doctors (The Federation of Finnish Midwives 2017).

More acute units are pregnancy emergency and delivery units. Birth hospitals must provide pregnancy emergencies which are on call 24/7. In a pregnancy emergency, the pregnant woman is examined by a midwife and, if necessary, by a doctor (TAUH 2021a). Pregnancy emergency pregnant women come in acute situations or with an emergency referral (Tapanainen et al. 2019). In Finland, a midwife in a delivery unit works very independently. If necessary, the midwife consults a doctor. (The Federation of Finnish Midwives 2017.) The EU directive defines that the role of a midwife is to care for and assist the mother during childbirth and to monitor the condition of the fetus in the womb (Directive 2005/36/EC). In the delivery unit, midwives´ work involves rapidly changing situations (The Federation of Finnish Midwives 2017). In the TAUH´s delivery unit patients can come straight from home whit contractions or from the pregnant women´s ward (TAUH 2021b). Women who have elective c-sections come also straight to the TAUH´s delivery unit for the surgery (TAUH 2021b).

2.2   iPana Maternity´s digital solutions

The EHRs are widely used in Finland. Since 2007 EHR´s prevalence has been 100 % in public health. In Finnish health care, the noticed problem is that there are separate systems in special care and primary health care. (Reponen et al. 2021.) An information flow between the primary health care maternity clinic and the birth hospital is essential to the continuity and safety of care (Duo-decim Terveyskirjasto 2020). Globally for years in maternity care, paper handheld records have been used to share information between the hospital, primary health care, and pregnant woman (Hawley, Jackson, Hepworth & Wilkinson 2014). The maternity EHR is to ease this data flow.

According to the study by Reponen et al. (2021), an increasing variety of electronic health services are available to citizens in Finland (Reponen et al. 2021). In the iPana Maternity Service PHP, there are in use digital solutions that enable the patient to be involved in the care. The web-based prelimi-nary information platform and the electronic self-monitoring platform are personal health data pa-tient portals of the iPana system. The patient can add information and measurements to the plat-forms and that was the reason why these solutions were included in the thesis. The electronic ma-ternity card was included because it is the first electronic maternity card taken into use in Finland.

One of the TAUH´s midwives' daily tools is to use the iPana system. Documentation has been men-tioned as a part of the Finnish midwife's profession. Midwives should be able to document patient data by the data protection and security required. (Savonia University of Applied Sciences.) In the EU directive, it is mentioned that a Member State should ensure that a midwife can draw up the necessary patient documents (Directive 2005/36/EC).

2.2.1 The web-based preliminary information platform

There is legislation towards maternity and birth documentation in healthcare. Legislation has some guidelines for the data collection about pregnancy and birth. It is based on the Act on the National Institute for Health and Welfare. There is information about every pregnant woman which the birth hospital should collect to the Finnish Institute for Health and Welfare. (Laki Terveyden ja hyvinvoin-nin laitoksesta 2008/668.) This data collection is earlier done by interviewing face-to-face or by pa-per questionaries. The necessary information about the woman´s health and the course of the preg-nancy is provided from the maternity clinic to the hospital using a background information form and a referral, either electronically or, in some cases, on paper (Tapanainen et al. 2019).

In the iPana Maternity Service PHP, preliminary information is collected electronically straight from the women. This kind of data collection gives an active role to the patient. (CSAM 2020a.) Also, pa-tient safety is improved when the background information comes straight from the patient (The Min-istry of Social Affairs and Health 2017).

In the hospital, the web-based preliminary information platform is checked in the delivery unit, pregnancy emergency, obstetric ward, and maternity policlinic. The midwife has a recording possi-bility to the web-based preliminary information platform if all the desired data is not transferred through integration to the hospital´s iPana (Aitamaa 2021b).

2.2.2 The electronic self-monitoring platform

One of the objectives, of the eHealth and eSocial Strategy 2020, is that citizens produce information for their own and professionals´ use on the digital platforms (The Ministry of Social Affairs and Health 2020, 10). For years patients had to collect self-measurements on paper. The modern solution is to collect the self-measurements straight to the digital platform professional to see results remotely. Providing citizens´ health and well-being data collection services is in line with national digitalization policy. The Ministry of Social Affairs and Health has digitalization guidelines for 2025. One of the alignments is to make services where citizens produce information for themselves and health care professionals. (The Ministry of Social Affairs and Health 2016.) In the Reponen et al. (2021) study was mentioned that nationally the patient's ability to send their measurement results and other information to healthcare providers has increased compared to 2017 in Finland (Reponen et al. 2021). The iPana Maternity Service PHP has a platform for blood pressure measurements and blood sugar measurements (CSAM 2020a).

Through the self-monitoring platform, the TAUH´s maternity policlinic midwives communicate whit the patient remotely. The midwife can, for example, comment on a patient's blood sugar levels and give follow-up instructions. (Aitamaa 2021a.)

2.2.3 The electronic maternity card

In the maternity clinic guide, the maternity card was defined as an information gate from the maternity clinic to the hospital (Klemetti & Hakulinen-Viitanen 2013). The given treatment and monitoring are documented in this record at each visit (Klemetti & Hakulinen-Viitanen 2013, 296; Hawley et al. 2014).

Originally the maternity card is a paper hand-held record that a woman carries into the maternity clinic and hospital visits. In Finland, the paper hand-held record has been in use for decades. The root of the maternity card goes into 1940 (Luoto 2015). The iPana´s electronic maternity card was piloted in the TAUH in the year 2013 (CSAM 2020a). In the year 2017, it was taken into use in the TAUH as the first Finnish hospital with an electronic maternity card (TAUH 2017).

At the maternity policlinic, the health monitoring of a pregnant woman happens, for example, through urine samples, blood pressure monitoring, blood samples, and fetal well-being monitoring via cardiotocography and ultrasound examination (TAUH 2020b). These vital measurements, and pregnancy stage information, have a marking place in the electronic maternity card (CSAM 2020b). Electronic maternity card is reducing double documenting between healthcare providers (CSAM 2020a).

Summanen (2019) has studied the experiences whit the electronic maternity card from the maternity clinic nurses' point of view. EHR´s support for nurses´ work varies across working environments (Kyytsönen et al. 2020). The use of a digital system is different in the calm appointment environment or in emergency income situations, where it is required a quick assessment. In EHR development work, it is good to consider the needs of all user groups (Kaipio et al. 2020).

2.3   Usability of EHRs

In information technology, the term usability is defined as follows (freely translated): "A feature that demonstrates how a system, device, program, or service is appropriate for an intended purpose for a particular audience" (Sanastokeskus ry 2006).

The usability of the EHRs is commonly assessed through Jakob Nielsen's definition. Even though Nielsen's publication has been around for decades, the same definitions still apply. Nielsen´s (1993) usability areas and definitions are shown in TABLE 1.

TABLE 1. Nielsen´s usability areas and definitions

Learnability	How easy it is for a user to perform a task with a system for the first time (Nielsen 1993, 27).
Efficiency	How quickly the user performs tasks after learning the use (Nielsen 1993, 123–125).
Memorability	How easily the use is remembered, if a user has not used the system for a while (Nielsen 2012).
Errors	How easily the user makes errors and how easily errors are corrected (Nielsen 2012).
Satisfaction	How pleasant the use is for the user (Nielsen 2012).

International Organization for Standardization (ISO) has made standards for information technology usability. The ISO 9241-11: Usability: Definitions and concepts -standard address usability characteristics from the end-users' point of view. (Bevan, Carter, Earthly, Geis & Herker 2016.) ISO 9241 has similarities for usability definition, for the end-user point of view, as Nielsen has defined. The standard considers learnability, as to how new users can use the system effectively. (Bevan et al. 2016.) System efficiency means that the users should achieve their goals of using the system effectively and efficiently. Users´ overall satisfaction with the system is also noticed in the standard. It includes for example positive attitudes, feelings, and comfort from the use of a system. (Bevan et al. 2016.)

In recent years, studies have been conducted on the experiences of healthcare professionals on the usability of EHRs´ (Hyppönen et al. 2018a). In Viitanen, Hyppönen, Lääveri, Vänskä, Reponen, and

Winblad's (2011) study there was used Nielsen´s usability goals and ISO standard 9241 as a base for the query to Finnish physicians. Research about evaluating the usability of healthcare information systems has been done, but unfortunately relatively few have concentrated on the nursing information systems (Moghaddasi, Rabiei, Asadi & Ostvan 2017). In Finland, the first-time nurses' experiences of usability were more widely surveyed in 2017 (Hyppönen et al. 2018a). The study´s questionnaire was based on the survey of physicians from the Viitanen et al. (2011) study (Hyppönen et al. 2018a). This means that these questions were also based on Nielsen's definition of usability and ISO standard 9241. Moghaddasi et al.'s (2017) study, which is later referred to, the questionnaire was based on ISO standard 9241. The survey of Kaipio et al. (2020), which is also mentioned later, was based on the National Usability (HIS-scale) (NuHISS). Nielsen's usability definition has affected NuHISS' usability questions (Hyppönen, Kaipio, Heponiemi, Lääveri, Aalto, Vänskä & Elovainio 2019).

The iPana Maternity´s digital solutions which are viewed in the thesis have been in use in TAUH for several years. After years of using the system, the users have a view of how well the system meets their needs. A systematic review by Ellsworth, Dziadzko, O'Horo, Farrell, Zhang, and Herasevich (2017) looked at 120 studies that examined the usability of an EHR. A system´s usability can be viewed in different phases of its lifetime. Ellsworth et al. (2017) had broken down the studies, of the systematic review, according to whether they were carried out in a prototype, requirements/development, or post-implementation phase. Scott, Sullivan, and Staib´s (2019) study represented a checklist for EHR implementation and digital transformation in hospitals. There was noticed that after the implementation, of a new digital solution, there should be evaluated systems quality. In this checklist, there was not mentioned a precise time when this kind of evaluation should be made. (Scott et al. 2019.) Lopez, Chin, Azevedo, Kaushik, Roy, Schuh, Banks, Sousa, and Morrow (2021) studied EHR usability after a 30–32-month period from implementation. There were assumed that longer experience with the new EHR will reduce shorter-term effects on clinicians´ workload and system usability. There were gained opposite results, a significant increase in workload after 2.5 years of implementation. This increment was associated with the usability evaluations. (Lopez et al. 2021.) The needs for the system´s functions change, as well as the health care. To get a functional system, it is developed and modified during its life. (Siponkoski 2017.)

2.3.1 Learnability

According to Nielsen (1993, 27), learnability is the most important attribute of usability. EHR´s learnability is evaluated in many surveys. Rajala (2013) studied the professional users´ experience with the setup of the iPana EHR and showed that one-third of the respondents wanted more training and simplification of the system. The Kaipio et al. (2020) study there was noticed a difference in learnability evaluation between user groups. Physicians evaluated the learnability of an EHR better than nurses (Kaipio et al. 2020). In the Moghaddasi et al. (2017) study nurses estimate the use of information systems to be easily and quickly learned. On the other hand, Saranto et al.'s (2020) survey revealed that two out of three nurses felt that the use of EHR required lengthy familiarization.

Vehko et al. (2017) mentioned in the end report of the project about digital work and stress, that especially new digital services needed more education. Users´ age can influence working with digital solutions. Kinnunen, Heponiemi, Rajalahti, Ahonen, Korhonen, and Hyppönen's (2019) study found that the user´s higher age was associated with a lower probability that the user received sufficient training in the system´s use. Also, Kinnunen et al. (2019) mentions that older nurses needed more support with the new digital way of working. The user´s higher age is associated with more stress with an information system (Heponiemi, Gluschkoff, Vehko, Kaihlanen, Saranto, Nissinen, Nadav & Kujala 2021). The length of work experience did not have same kind of affect based on Kaihlainen et al. (2019) study. Kaihlainen et al.´s (2021) study looked at the impact of different lengths of work experience on the stress experienced by nurses with information systems. According to this study, both newly qualified and more experienced nurses felt stress and anxiety from poorly functioning systems (Kaihlainen et al. 2021). The proper training of a new information system increases nurses´ well-being (Heponiemi et al. 2021).

2.3.2 Efficiency

The efficiency of a system is mentioned as an important feature in the Scott et al. (2019) checklist for digital solution implementation evaluation in hospitals. The efficiency of EHR includes multiple areas. Users should be able to perform routine tasks in a way that is easy for users. Easily navigable electronic health platform affects higher user efficiency. Also, navigability increases satisfaction with the system. (Petersen, Nielsen, Olsen & Kok 2019.) Unfortunately, in the Hyppönen et al. (2018a) study under half of the hospital working nurses estimated that from EHR is easy to get the needed information to the patient care. Petersen et al. (2019) suggested in their article, that eHealth services should highlight important information as well as use signals to attract the user's attention if necessary. Vehko et al. (2017) mentioned that systems that are easy to use, support nurses' well-being by reducing the experience of urgency at work. In Jansson, Liisanantti, Ala-Kokko, and Reponen´s (2022) study physicians' views on clinical information systems' usability in intensive care units in Finland. Of the respondents, only 37.6% answered that performing routine tasks is simple (Jansson et al. 2022). The same kind of results was revealed in the Hyppönen et al. (2018a) study, nurses assessed EHRs supporting poorly the performing of routine tasks. On the other hand, in the Kaipio et al. (2020) study there were noticed that nurses gave a better evaluation of EHR´s capability to perform routine tasks than physicians.

Double documenting can decrease the system's efficiency. It exposes users to make mistakes (Hyppönen et al. 2018a) and it is slowing the work (Vehko et al. 2019). The usability of an EHR can save time from the user to patient work (Hyppönen et al. 2018a). Nurses have mentioned double documentation as a problem in the Finnish EHRs´ (Hyppönen et al. 2018a; Kyytsönen et al. 2020). The same challenges were noticed in the Jansson et al. (2022) study of physicians.

There is research also on how EHRs support cooperation between occupational groups or between patient-healthcare professional relationships. In the Kaipio et al. (2020) study, nurses were more

positive than physicians on the ability of systems to support cooperation and exchange of information between physicians and nurses. At its best, new technical solutions support collaboration also between the patient and the healthcare professional. Unfortunately, Kyytsönen, Hyppönen, Koponen, Kinnunen, Saranto, Kivekäs, Kaipio, Lääveri, Heponiemi, and Vehko (2020) study showed that nurses thought the EHR did not support this kind of cooperation.

Part of usability and systems efficiency, Nielsen mentions, is the system´s language. Language means the actual language, but also the terminology. (Nielsen 1993, 123-125.) The used terminology should be understandable without the users having to go look up a word's definition (Nielsen 2020). The language used in the system is also mentioned by Petersen et al. (2019) study. The unofficial language increases the feeling that the user is more personally connected to the system. This increases trust, which has a positive impact on satisfaction. (Petersen et al. 2019.) In the Hyppönen et al. (2018a) study nurses evaluated that the clear terminology was the best to support the ease of use of the system in hospitals. Kaipio et al. (2020) study revealed that nurses evaluated EHR terminology more positively than physicians.

2.3.3 Memorability

The memorability of an EHR has been assessed in some studies. In 2010 in Finland there were published studies of the nursing recording model and nursing reports. In this study, there were noticed that the use of nursing information systems required a lot of memorizing and remembering. Memorability has been raised as an important feature in the study. (Nykänen, Viitanen & Kuusisto 2010.) Memorability was mentioned also in the Moghaddasi et al. (2017) study. In this study nurses evaluated that it was easy for nurses to remember how to use the systems after a long interruption (Moghaddasi et al. 2017). The Rogers, Sockolow, Bowles, Hand, and George (2013) study criticized multiple clicking in the use of an EHR. It did not ease the nurses´ memory load and the users had to remember the actions they had done, and which were still ongoing (Rogers et al. 2013).

2.3.4 Errors

In the Scott et al. (2019) checklist for hospitals, whit new digital solutions, there was mentioned reduction of errors as one notable feature, that should be evaluated in a system. Few errors are part of usability and errors in the use should be at a minimum (Nielsen 1993, 20, 32).

In the Moghaddasi et al. (2017) study was noticed the system´s improvement needs error prevention. The same kind of result was revealed in the Hyppönen et al. (2018a) study. Finnish nurses were dissatisfied with the EHRs´ errors prevention (Hyppönen et al. 2018a) and there is identified the defenses in the EHRs´ medication list as a development target (Kyytsönen et al. 2020). In the Kaipio et al. (2020) study physicians in health centers were more satisfied than nurses with EHR´s capacity to prevent errors with medication. EHR which is lacking usability can cause errors that can harm the patient (Ratwani et al. 2018; Kaipio et al. 2020). A study done in a pediatric setting revealed patient safety problems associated with EHR´s usability problems (Ratwani et al. 2018). Patients' safety hazards whit EHR problems were noticed also in the Jansson et al. (2022) study. In

this study, nearly a third of respondents felt that the patient had almost been harmed or caused by system failures (Jansson et al. 2022).

2.3.5 Satisfaction

Systems should also consider user satisfaction (Nielsen 2012). System satisfaction can be simply asked subjective opinions (Nielsen 1993, 34).

User satisfaction is mentioned in the Scott et al. (2019) article as an evaluating feature of an EHR. The satisfaction experienced with the system is influenced by many factors. In the Kaipio et al. (2020) study there was seen a difference in satisfaction with the same EHR between the group of physicians and the nurses. A health application usability survey for patients found that age and IT/computer use experience influenced the use of an application and the assessment of satisfaction (Georgsson & Staggers 2016). In 2016 nurses´ satisfaction, with EHR´s where low in the international study (Topaz et al. 2016). Although there are challenges in the use of healthcare technology, progress has been made whit the usability of EHRs in recent years. The 2020 survey included a larger number of nurses who found EHRs beneficial. (Saranto et al. 2020.)

In the Kinnunen et al. (2019) study was noticed that more than six years of experience with the EHR is associated whit higher competency. Pitkänen and Pitkäranta (2014) propose that there should be a distinction made between nurses with different working experiences in assessing the usability of the new health care information system. They mentioned two groups, experienced nurses (experience 5-10 years) and recent graduates (Pitkänen & Pitkäranta 2014).

3   PURPOSE, OBJECTIVE AND RESEARCH QUESTIONS

The objective of the thesis is to map the midwives' view of the iPana maternity´s digital solutions usability. Digital solutions, a web-based preliminary information platform, an electronic self-monitoring platform, and an electronic maternity card section, of the system, are under research.

The purpose of the thesis is to get answers to the following core questions:

- How do the end-user midwives evaluate the usability of the digital solutions of the iPana Maternity?

- Which iPana Maternity´s functions support the end-user midwives' work?

- What are the aspects that the end-user midwives think should be improved in the iPana Maternity system?

4 RESEARCH IMPLEMENTATION

4.1 Target groups

The target groups of the survey are iPana end-user midwives, in TAUH´s (Pirkanmaa Hospital District) delivery unit, pregnancy emergency, obstetric ward, and maternity policlinic. The client of the thesis, the Pirkanmaa Hospital District, wanted to include the midwives of these units in the study. These groups of midwives' jobs in the units are different, as is the use of the iPana. With these groups, a broader view of usability is gained. It is noticed that the same EHR support for nurses´ work varies across working environments (Kyytsönen et al. 2020).

4.2 Data collection method

The data was collected with a quantitative method. In survey research, there are asked questions, for example, about experiences and attitudes, from groups or groups of people (Leedy & Ormrod 2020, 181). One data collection method in the survey is a written questionnaire (Leedy & Ormrod 2020, 181). A questionnaire is the most common way of collecting data in quantitative surveys (Vilkka 2021b), and this method was used in this thesis. The questionnaire is a good way of data collection when trying to get a large amount of information remotely (Leedy & Ormrod 2020, 182). In Ellsworth et al.'s (2017) systematic review of the 120 viewed studies, the most common method for EHR usability evaluation is questionnaires for end-users. These kinds of surveys are useful when collecting information about the user's perception, and how useful, usable, and satisfactory the EHR is (Zhang & Walji 2011).

Midwives were informed by email, and willing participants were answering the electronic query. The survey was done remotely via Webropol 3.0. Mainly questions were half structured. In the email there was link to the questionnaire (Appendix 3), and as an attachment the cover letter (Appendix 2), and the privacy statement (Appendix 4). These were formulated by TAUH´s and Savonia´s recommendations and are in Finnish.

At the beginning of the questionnaire, there were a few background information questions. These are age (question 1.), working years as a midwife (question 2.), working unit or units (maternity policlinic, pregnancy emergency, delivery unit, obstetric ward) (question 3.), and own assessment of technical skills (question 4.). Age is asked because it can affect to system´s use based on previous research from Vehko et al. (2017), Kinnunen et al. (2019) and Heponiemi et al. (2021). Working years as a midwife is asked because the default is that if you have long experienced the use of the system should be easier and of course, you can also evaluate it better. Pitkänen and Pitkäranta (2014) have proposed that there should be a distinction made between nurses with different working experiences in assessing the usability of a system. In the query, there is possible to select 0-5 years' experience or six or more years of working experience. Working unit or units is asked because the use of the system is different depending on the unit and Kyytsönen et al. (2020) have men-

tioned that EHR´s support for work varies in different working environments. Assessment of technical skills is asked because based on Georgsson & Staggers's (2016) study IT/computer use experience can influence the use and the satisfaction.

Questions about the digital solutions are divided into three sections, according to the digital solutions (the web-based preliminary information platform, the electronic maternity card, and the self-monitoring platform). Before each section´s questions there are asked about the use of the section in questions 5., 15., and 27. Before the web-based preliminary information section (question 5.), the self-monitoring section (question 15.), and the electronic maternity card (question 27.) questions the respondent has to select one choice "I've used a section to view patient data", "I've used a section to document patient data.", "I have used the section to view and document patient data." or "I have not used the section". If the respondent selects the last choice, the respondent moves to the next section or the end of the query. If there is no use no feature can be evaluated.

Other questions in the sections are based on Nielsen's (1993) definition of usability, and they cover the five areas of usability (easy to learn, efficiency, easy to remember, few errors, and satisfaction). The questions have also been influenced by the wishes of the client, the Pirkanmaa Hospital District. The questions are divided into sections (TABLE 2.). Learnability claims should give information on ease of use (TABLE 2., questions: 6., 16., and 28.). About the efficiency, there are many claims (TABLE 2., questions: 7.-10., 17.-22., 29.-32). Efficiency claims provide information about different aspects of usage, whether the necessary information can be easily found, the terminology of platforms, the performance of routine tasks, double documentation, and integration. There is one memorability claim per digital solution (TABLE 2., questions: 11., 23. and 33). Errors are asked in two ways, how easily errors are made (TABLE 2., questions: 12., 24, and 34.) and how easily those can be corrected (TABLE 2., questions: 13., 25. and 35.). The claims measuring satisfaction (TABLE 2., questions: 14., 26. and 36.) give an overall information on the pleasantness of the use.

TABLE 2. Questions

Questions 1.-4., the background information			
Questions 5., 15. and 27., the use of each section			
	THE WEB-BASED PRELIMINARY INFORMATION PLATFORM	THE SELF-MONITORING PLATFORM	THE ELECTRONIC MATERNITY CARD
LEARNABILITY	6. Learning how to use the web-based preliminary information platform was easy	16. Learning how to use the self-monitoring platform was easy	28. Learning how to use the electronic maternity card was easy

EFFICIENCY	7. I can easily find the information I need from the web-based preliminary information platform	17. I can easily find the information I need from the self-monitoring platform	29. I can easily find the information I need from the electronic maternity card
	8. In the web-based preliminary information platform, the terminology is clear	18. I can easily notice abnormal blood sugar values from the self-monitoring platform	30. In the electronic maternity card, the terminology is clear
	9. Performing routine tasks with the web-based preliminary information platform is easy and could be done without additional choices	19. I can easily notice abnormal blood pressure values from the self-monitoring platform	31. Performing routine tasks with the electronic maternity card is easy and could be done without additional choices
	10. The essential information recorded by the customer in the web-based preliminary information platform is transferred by integration into the hospital's iPana system	20. In the self-monitoring platform, the terminology is clear	32. The essential information recorded by the customer in the electronic maternity card is transferred by integration into the hospital's iPana system
		21. Performing routine tasks with the self-monitoring platform is easy and could be done without additional choices	
		22. The information entered in the self-monitoring platform does not need to be recorded anywhere else	
MEMORABIL-ITY	11. After a break, it is easy to remember to use the web-based preliminary information platform	23. After a break, it is easy to remember to use the self-monitoring platform	33. After a break, it is easy to remember to use the electronic maternity card
ERRORS	12. I don't easily make mistakes when using the web-based preliminary information platform	24. I don't easily make mistakes when using the self-monitoring platform	34. I don't easily make mistakes when using the electronic maternity card
	13. If I make a mistake in the web-based preliminary information platform, the error is easy to fix	25. If I make a mistake in the self-monitoring platform, the error is easy to fix	

			35. If I make a mistake in the electronic maternity card section, the error is easy to fix
SATISFAC-TION	14. I am satisfied with the use of the web-based preliminary information platform	26. I am satisfied with the use of the self-monitoring platform	36. I am satisfied with the use of the electronic maternity card

A rating scale, the Likert scale, is useful when evaluating attitudes (Leedy & Ormrod 2020, 183). In the questionnaire, the Likert scale is used in half structured questions.

Open-ended questions can give insight information that the survey could not provide otherwise (Leedy & Ormrod 2020, 187). With an open-ended question, it is possible to get new points of view or good suggestions for improvement (Heikkilä 2014). In the questionnaire, there was one open-ended question (question 37.) "What development targets do you see in the iPana Maternity system?".

Pilot testing of the questionnaire was done before the actual survey in October 2021. Heikkilä (2014) recommends sending the digital query to a few pilot testers to make sure that the test works as it should be. The pilot survey examined the comprehensibility of the questions, the time of response to the questionnaire, and the logic of the questions. Based on the feedback the query´s language and questions were clarified.

4.3   Data collection

The survey was done via Webropol from November 18, 2021, to December 6, 2021. When submitting an electronic questionnaire, it should be considered that respondents should have equal opportunities to reply to the questionnaire (Vilkka 2021b). The aim was to ensure this by planning the survey for the period before the Christmas holidays and the lower number of work hours due to public holidays. The link to the questionnaire was sent via email. Anna Aitamaa, the contact person from the TAUH, sent the emails to the TAUH delivery unit, pregnancy emergency, obstetric ward, and maternity policlinic midwives. Altogether 100 midwives got the link. Reminders can increase the number of respondents (Vilkka 2021a) and during the answering time, the contact person Aitamaa sent reminders to midwives.

5   RESULTS

The questionnaire was sent to 100 midwives (N), and the sample size (n) was 37. The answer present was 37.

The results of the survey were transferred from Webropol to Excel, where the statistics were made during the spring 2022. Partially disagree -answers are united whit disagree-answers. Partially agree -answers are united whit agree-answers. Neither agree nor disagree -answers are in the diagrams seen as neutral.

Some background information variables were reframed to own Excels. These were midwives who work in the acute units (pregnancy emergency and delivery room), maternity policlinic midwives, midwives who evaluated their technical skills well, and those who evaluated technical skills as weak. Also, older midwives' results were viewed separately. Originally it was mentioned to view older midwives, 56 years and older as a separate group, but because this group was just one person, this was united whit the 46 years old midwives' group.

Answers to an open-ended question 37., were planned to analyze based on qualitative content analysis. Whit content analysis the collected data can be organized and drawn into results (Bengtsson 2016). However, the replies were largely short and were given by only nine out of 37 respondents. Therefore, thorough content analysis could not be carried out. In content analysis, the material can be divided into themes (Tuomi & Sarajärvi 2017). The answers to the open-ended question were divided according to Nielsen´s (1993) usability definition. Development proposals were about the system´s efficiency and errors. These are presented after quantitative answers.

5.1   Respondents background information and use of the digital solutions

Most respondents (38%) were aged 36–45. Around one-third of the respondents were aged 26–35 (30%) and 46–55 (27 %). There was only one person aged over 56 and one person under 25.

Most of the respondents (78%) had a long working experience. They had been working as a midwife for six years or more.

Many of the respondents did not have only one working unit in the TAUH. The sample size was 37 and selected working units were 59 (TABLE 3.). The lowest answering percent, 19%, was from the maternity policlinic. Most of the respondents, 70% were working in the delivery unit. In the obstetric ward, working midwives were 41%, and in the pregnancy emergency 30%.

TABLE 3. Midwives working units

	n	Percent
Maternity policlinic	7	19%
Pregnancy emergency	11	30%
Delivery unit	26	70%
Obstetric ward	15	41%

Most respondents (76%) agreed that their technical skills are in a good level. Few (19 %) disagreed whit the claim.

Over half (54%) of the respondents had used the web-based preliminary information platform to view and document patient data. Some of the respondents (38 %) had used the section to view patients' information. Only 8 % had not used the web-based preliminary information platform.

Almost half (46 %) of the respondents had used the self-monitoring platform to view patients' information. Few (19 %) of the midwives, had used the self-monitoring platform, to view and document patient data. Of the respondents, who worked in the maternity policlinic, only two had also documented information in the self-measurements section. Over one third (35%) of the respondents

Approximately half (51%) of the respondents had used the electronic maternity card just to view patient data. There were 46% of respondents, had used the electronic maternity card to view and document patient data. One of the respondents had not used the section.

5.2   Midwives' evaluation to the usability, supporting features and improvement needs
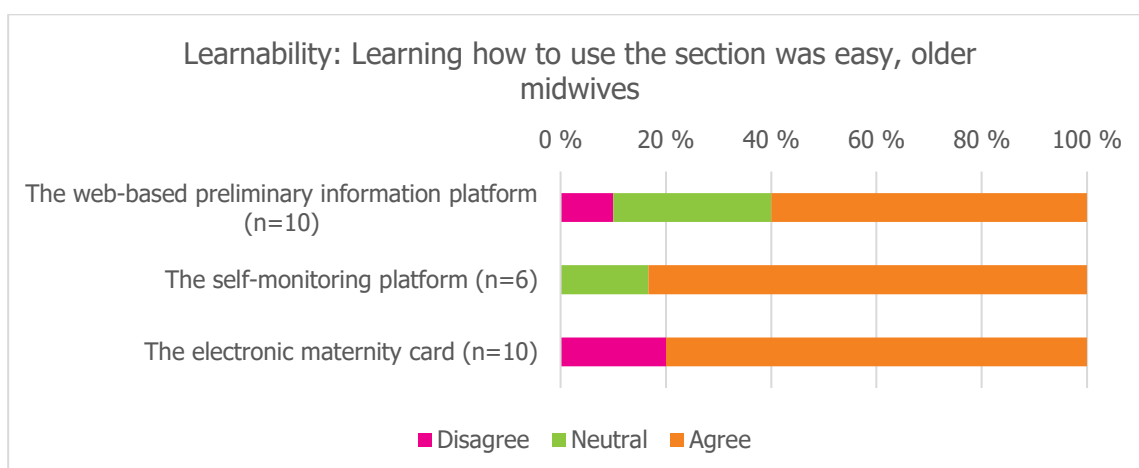
5.2.1   Learnability is supporting usability

Most of the respondents could agree that learning how to use the viewed iPana´s digital solutions was easy (PICTURE 1.). The web-based preliminary information platform (9%) and the self-monitoring platform had (8%) almost the same disagreeing answers to learnability. The electronic maternity card was evaluated as the easiest to learn.
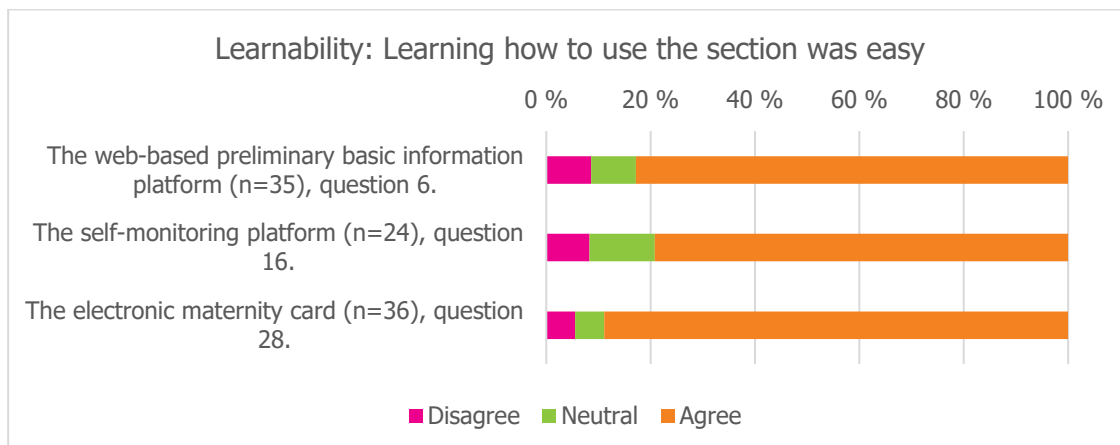
PICTURE 1. Learnability: Learning how to use the section was easy

Older midwives (age over 46) results about learning were viewed in a separate picture (PICTURE 2.). This was based on the previous studies from Vehko et al. (2017), Kinnunen et al. (2019) and Heponiemi et al. (2021), where age was influencing the learning or training of a system. Older mid-wives evaluated more critically, especially the web-based preliminary information platforms' learna-bility. Evaluating this section there were a lot of, 30%, neutral answers. The electronic maternity card´s learnability got more disagreeing answers (PICTURE 2.) when comparing the whole sample (PICTURE 1.).

PICTURE 2. Learnability: Learning how to use the section was easy, older midwives

5.2.2 Efficiency: finding information and terminology supporting usability, noticing abnormal values, performing routine tasks and double documenting were lowering usability

Efficiency was evaluated in four claims in the web-based preliminary information platform and the electronic maternity card. In the self-monitoring section, there were six claims about efficiency. Most

of the respondents agreed on whit the efficiency claims but there could be seen also development needs.

Most of the respondents evaluated that they can easily find the information they need from the sections (PICTURE 3). The web-based preliminary information platform got the most disagreeing answers, 20% did disagree whit the claim.
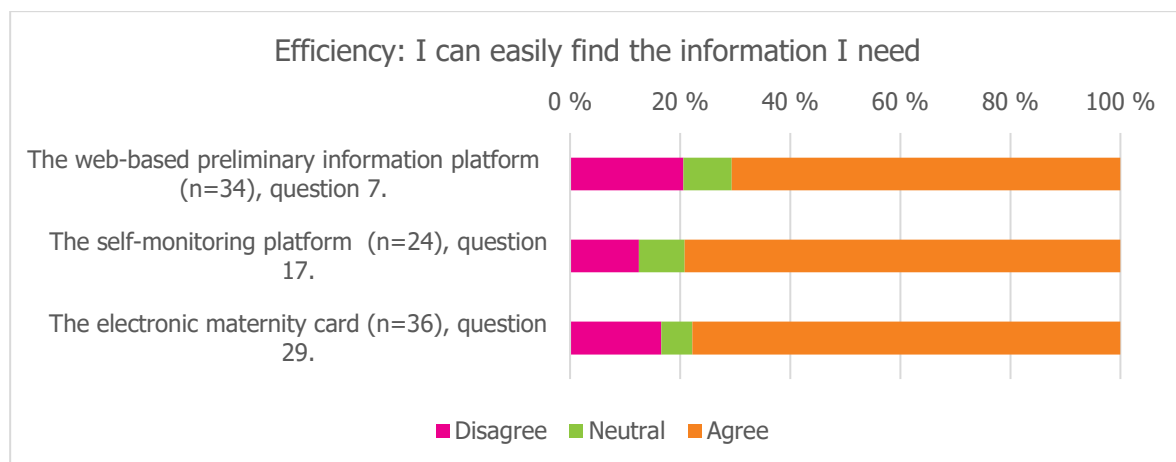
PICTURE 3. Efficiency: I can easily find the information I need

In the self-monitoring platform, there were two extra questions about efficiency (PICTURE 4.). These were noticing the abnormal blood sugar and blood pressure values. Noticing abnormal values got weaker results than finding information from the system. Under half (44%) of all respondents agreed that they can easily notice abnormal blood sugar values. The same kind of results was from noticing the abnormal blood pressure values: half (50%) agreed. In both claims, there were a lot (30% and 29%) neutral answers.
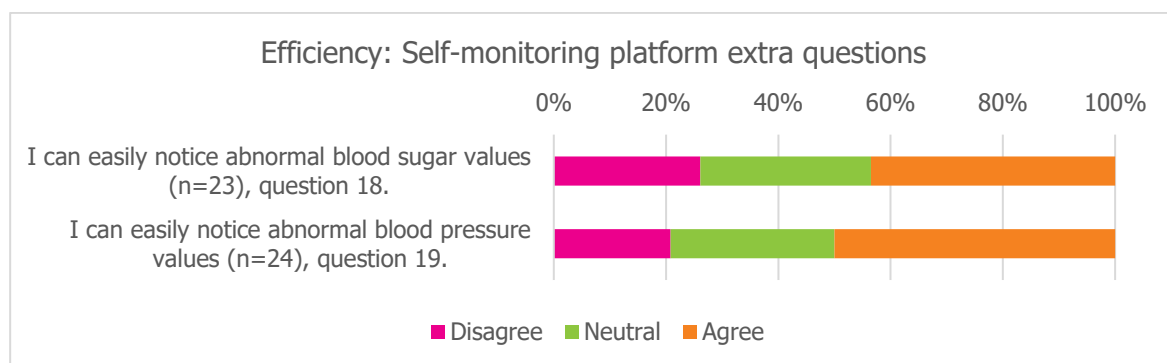
PICTRURE 4. Efficiency: Self-monitoring platform extra questions

Terminology was evaluated as clear in all sections (PICTURE 5.). The self-monitoring platforms terminology got the best result. There were 92% of respondents evaluated the self-monitoring platforms' terminology as clear.
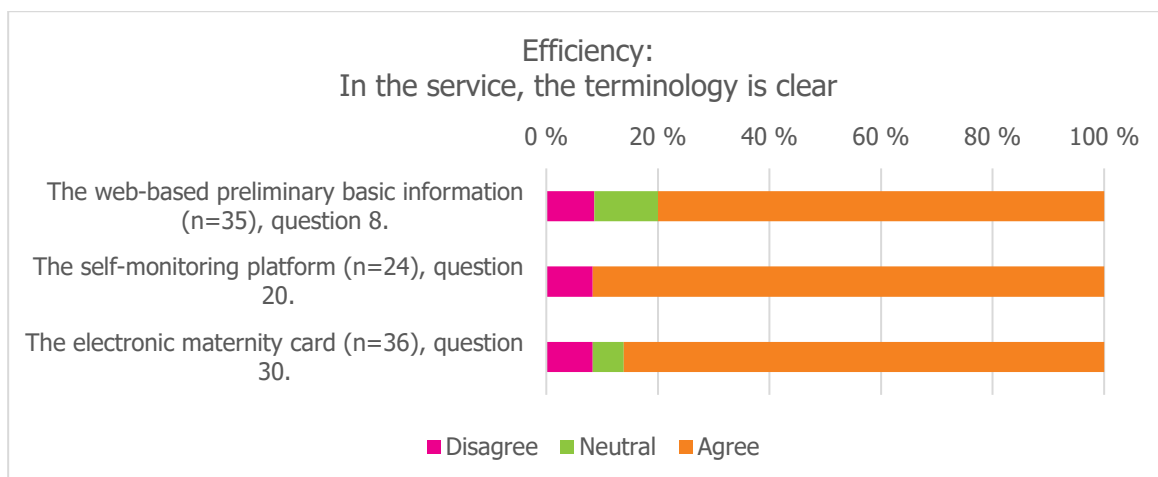
PICTURE 5. Efficiency: Terminology is clear

Performing routine tasks were evaluated more critically (PICTURE 6.). All sections got under 70% agreeing answers. The self-monitoring section got only 58 % of respondents who could agree on whit the claim.
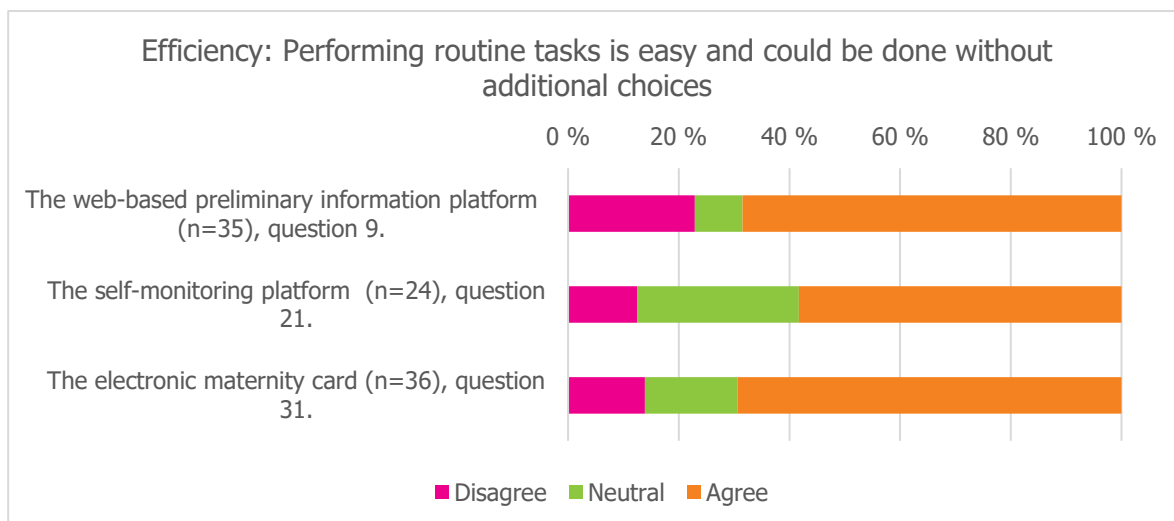
PICTURE 6. Efficiency: Performing routine tasks is easy and could be done without additional choices

The last section about the efficiency evaluation was about integration or double documenting. From the web-based preliminary information platform (question 10.) and the electronic maternity card (question 32.), there were asked if the essential information recorded by the customer in the section was transferred by integration into the hospital's iPana system. From the self-monitoring platform (question 22.) there were asked to do the information entered the platform needed to be recorded anywhere else. The question is not the same in each section and that's why the questions are mentioned also in PICTURE 7. with the results.

When evaluating the self-monitoring platform about one-third (29%) of the responders disagreed whit the double documenting claim, only 33 % agreed. They thought that the information entered in the self-monitoring section needed to be recorded also elsewhere. Integration between the web-based preliminary information platform and the electronic maternity card was evaluated more positively. When evaluating the web-based preliminary information platform, 17%, and the electronic maternity card,19%, though the essential information recorded by the customer does not transfer by integration into the hospital´s iPana system. (PICTURE 7.)
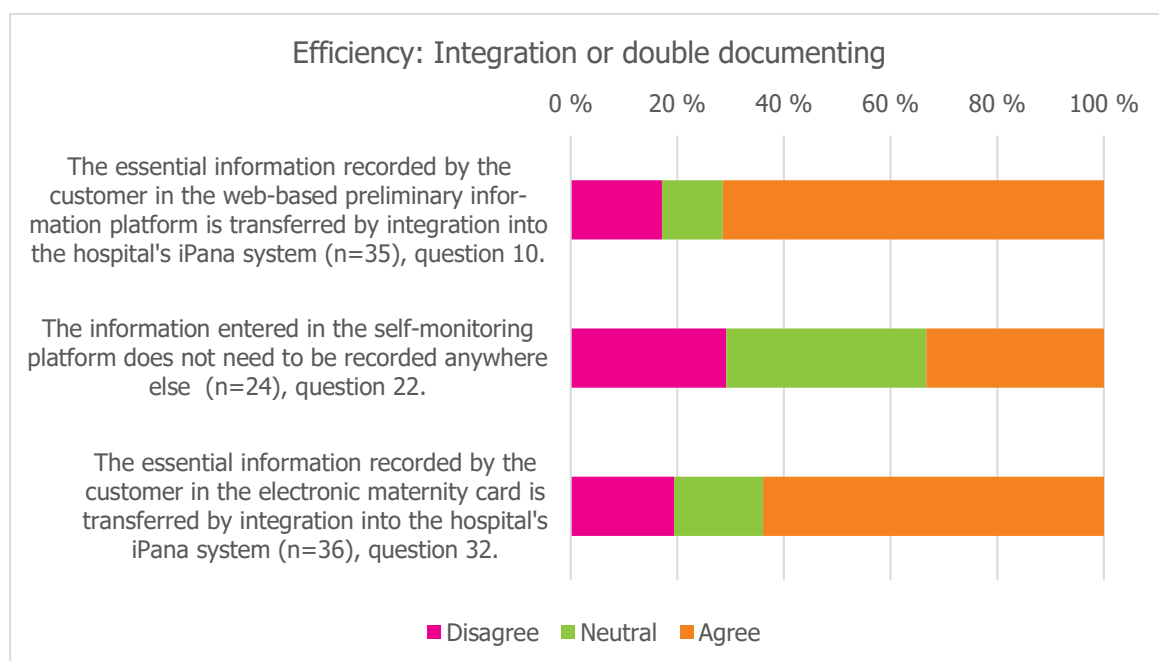
PICTURE 7. Efficiency: Integration or double documenting

From the more acute units, pregnancy emergency, and delivery unit, some efficiency results were viewed separately. There were wanted to see how easily they estimate the information is found on the web-based preliminary information platform and the electronic maternity card. This was because in these units there are quick income situations when information should be easily found. The self-monitoring platform was not included, because in the quick income situation the quick assessment

information is more critical than longer monitoring information. The results were in the same direction that average. Most of the pregnancy emergency and delivery unit midwives agreed that they can easily find the information needed from these sections (PICTURE 8).
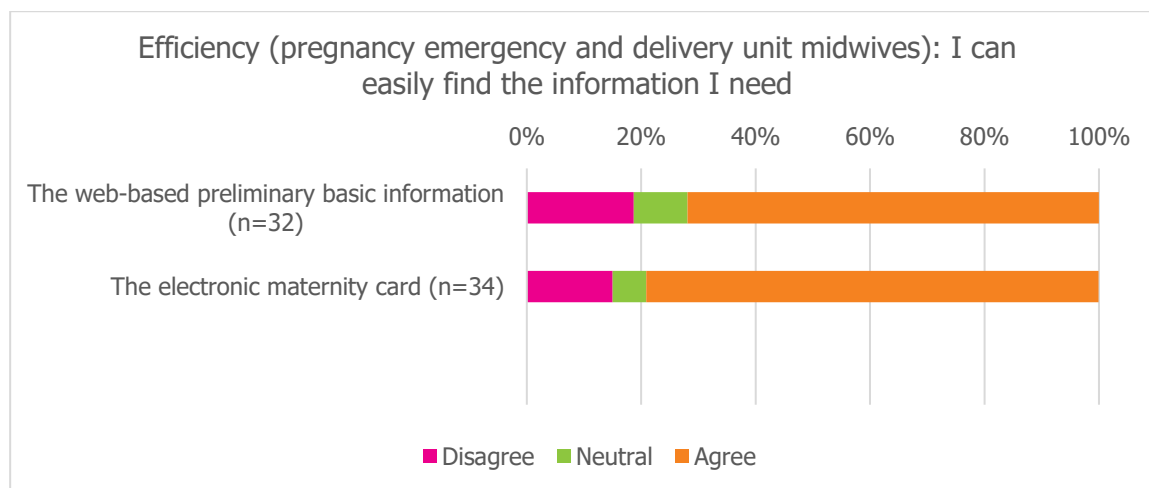
PICTURE 8. Efficiency (pregnancy emergency and delivery unit midwives): I can easily find the information I need

There were viewed separately some maternity policlinic midwives' evaluations because they give guidance through the self-monitoring platform. They gave better results when evaluating the self-monitoring platform. All agreed that they can easily find the information needed from the self-monitoring platform. Also, maternity policlinic midwives assessed better the detection of abnormal blood sugar or blood pressure levels (PICTURE 9.).
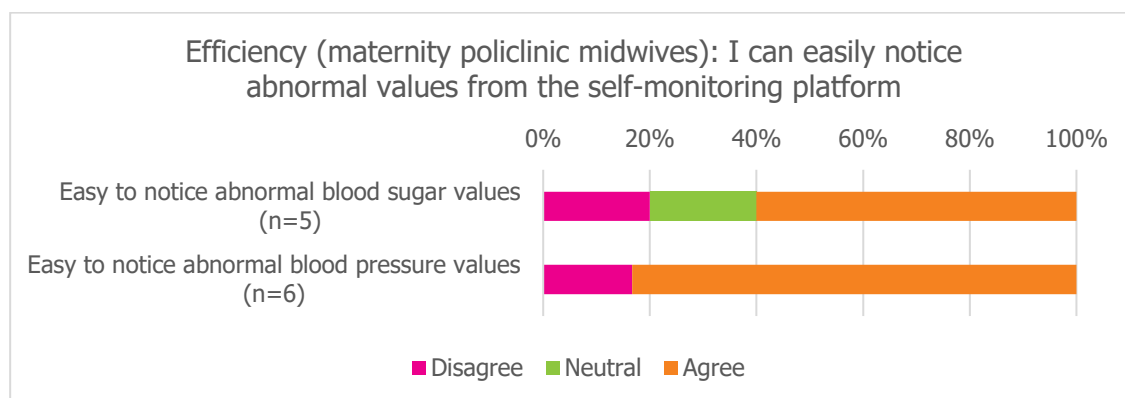
PICTURE 9. Efficiency (maternity policlinic midwives): I can easily notice abnormal values from the self-monitoring platform

5.2.3 Memorability is supporting usability

The memorability of the sections was evaluated by one claim. Most respondents assessed all sections' memorability as good (PICTURE 10). The best result from the memorability got the electronic maternity card, 86% of the respondents could agree on whit the claim. Of the web-based preliminary information platform respondents, 24% disagreed whit the memorability claim, and 68% agreed.
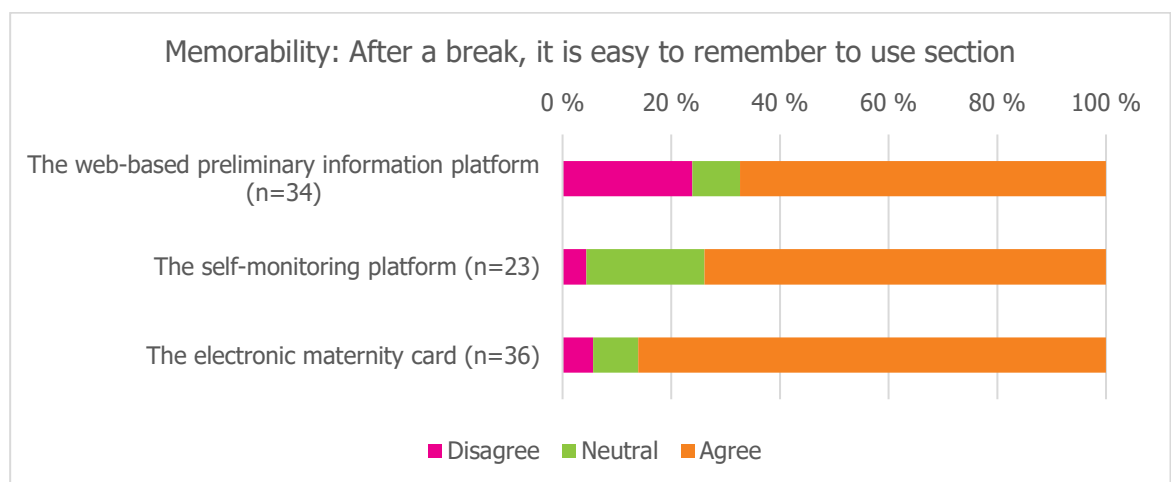
PICTURE 10. Memorability: After a break, it is easy to remember to use section

Midwives' results, who evaluated that their technical skills were weak, were viewed separately because it could be assumed that this could affect the memorability of the use. These midwives who also answered to the web-based preliminary information platform (n=7), thought critically about the section´s memorability. Over half (57%) disagreed that the use of the section is easy to remember after a break. The same kind of disagreement was not whit the self-monitoring platform or electronic maternity card.

5.2.4 Correcting errors were hard to evaluate

Errors were evaluated in two claims from each digital solution. First respondents answered the question "I don't easily make mistakes when using the section" and after that, they evaluated how easily errors can be corrected. Over half of the respondents evaluated that they agreed that they don't easily make mistakes when using the web-based preliminary information platform and the self-monitoring platform (PICTURE 11.). Also, there were a lot of neutral answers (35%) when respondents evaluated the self-monitoring platform. Most of the respondents (75%) evaluated that they do not make easy mistakes in the use of electronic maternity card (PICTURE 11.).
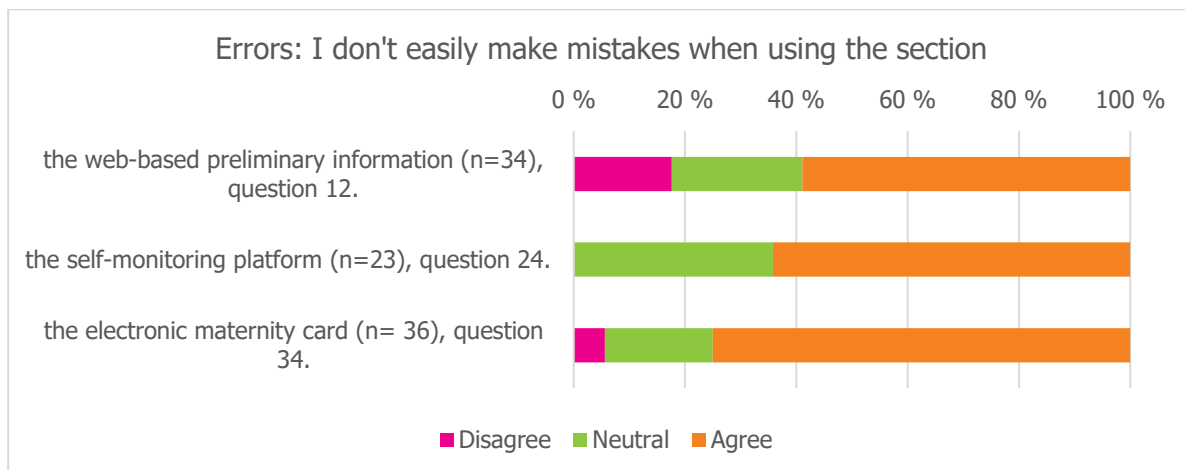
PICTURE 11. Errors: I don't easily make mistakes when using the section

To the claim "If I make a mistake in the section, the error is easy to fix" there were many respondents who could not disagree or agree. There were over half of the answers neutral when evaluating the web-based preliminary information platform and the self-monitoring platform. In the electronic maternity card section, there were 44% neutral answers. (PICTURE 12.)
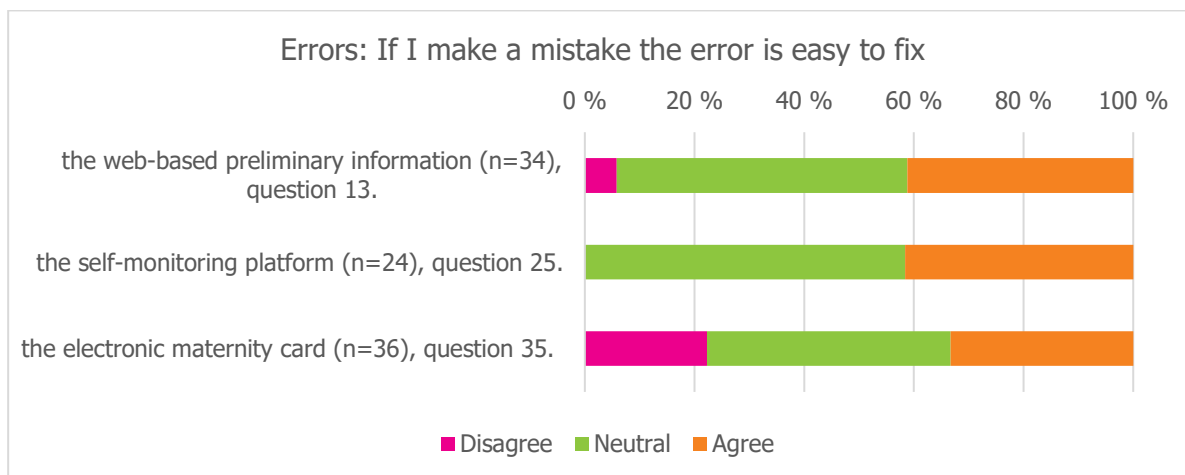
PICTURE 12. Errors: If I make a mistake the error is easy to fix

5.2.5 Satisfaction is mainly good, longer user experience affected negatively

Most of the respondents were satisfied whit the sections (PICTURE 13). The lowest satisfaction rate got the web-based preliminary information platform. Only 59 % were satisfied with the section and 21 % disagreed whit the claim. The electronic maternity card had 83 % satisfied users among respondents and the self-monitoring platform had 79 %.
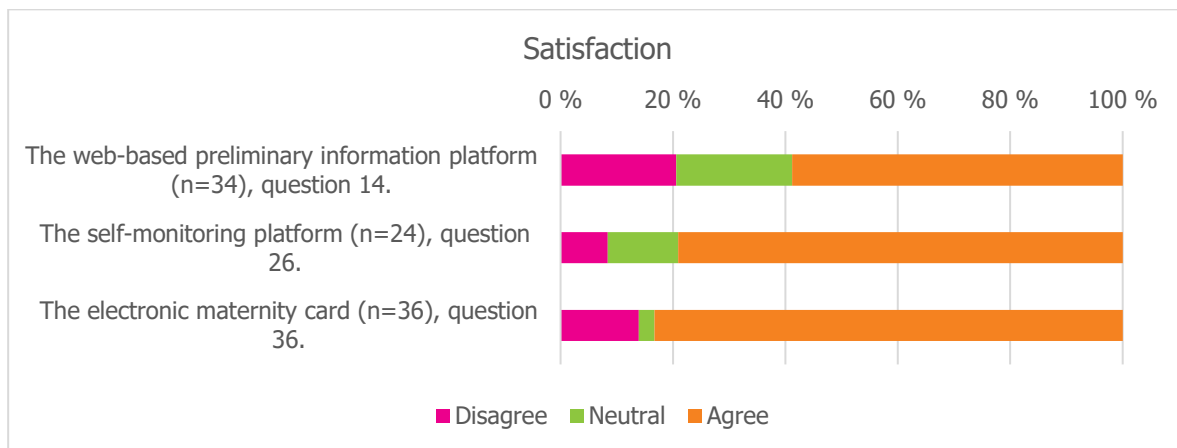
PICTURE 13. Satisfaction

There were wanted to see how midwives, who estimated their technical know-how to in a good level, evaluate satisfaction with the sections. Correlation between technical skills to satisfaction is noticed in the Georgsson and Staggers (2016) study. This group's results (PICTURE 14.) were quite the same as average (PICTURE 13). The lowest satisfaction rate got the web-based preliminary information platform. The electronic maternity card had 82% satisfied users among respondents. Of the midwives who evaluated that their technical skills were weak (n=7) 43% answered that they are not satisfied with the web-based preliminary information platform.
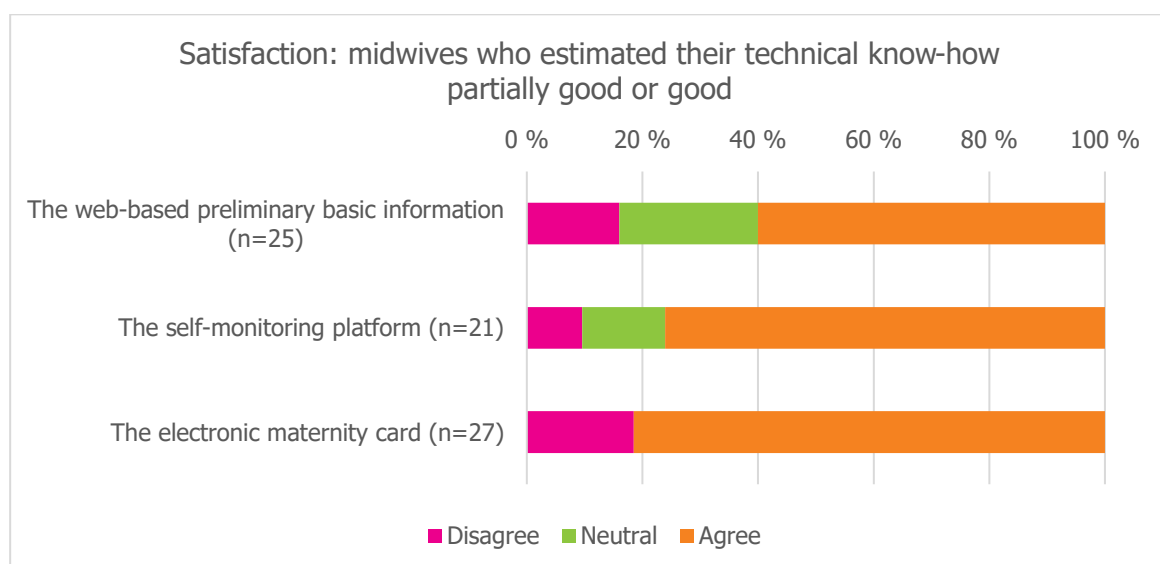
PICTURE 14. Satisfaction: midwives who estimated their technical know-how partially good or good

There were also compared working experience affect to satisfaction because Kinnunen et al.'s (2019) study were noticed that longer experience with the EHR is associated whit higher competency. In the midwives' group, 0-5 years of working experience, were higher present in the agreeing

answers to all the sections, compared to midwives who had 6 years or more working experience. On the other hand, in the 0-5 years working experience group there were more disagreeing answers regarding the web-based preliminary information platform´s satisfaction. Midwives who had working experience of over 6 years evaluated more critically the satisfaction towards all the sections. (PICTURE 15.)
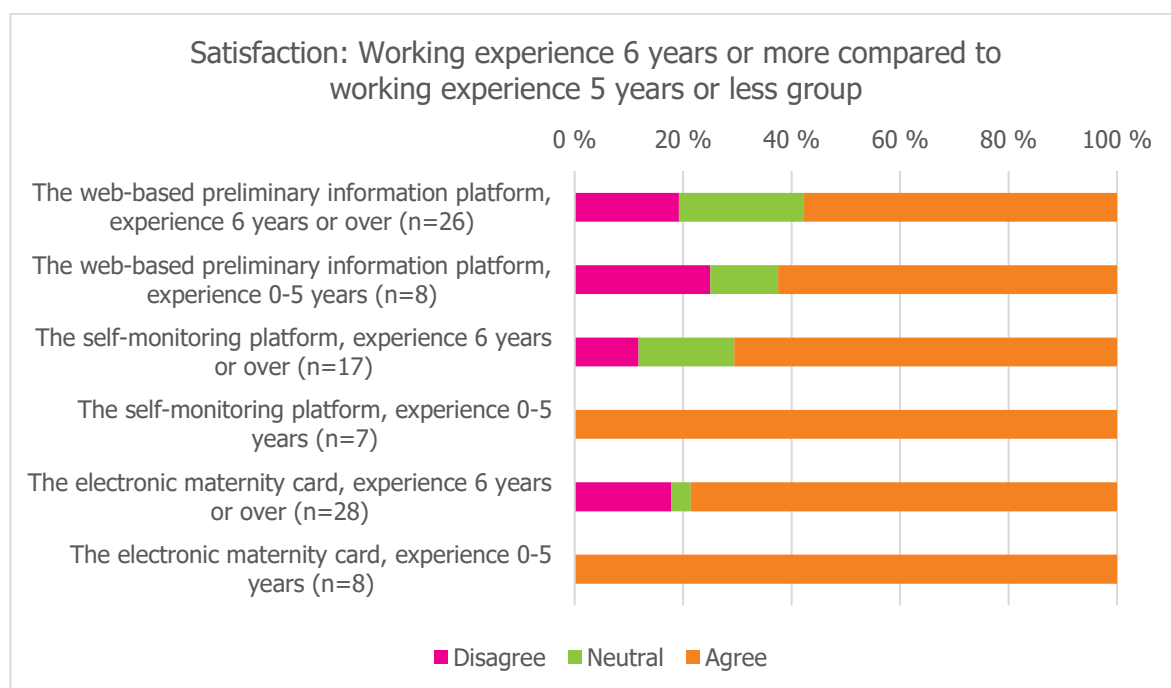
PICTURE 15. Satisfaction: Working experience 6 years or more compared to working experience 5 years or less group

5.2.6 The development proposals to efficiency and error prevention

Of the open-ended questions answers, most were about the system´s efficiency. These were about systems flexibility, finding the information, and integration. There were wished smoother opening of the system, not saving all the time (if nothing is changed) and patients' own documentation more easily to be read.

Fluent data transformation was wished towards the patient side. There was a proposal that if a midwife gives feedback to the patient in the self-measurement section, patients could get an email reminder to go and read this.

There were wishes that the data should be easier to find in the self-measurement section. Color codes were desired for abnormal blood sugar and blood pressure values. It was also hoped that the food diary would be clearer.

Integration was mentioned in many proposals. There were wished for better integration between the hospital´s iPana and iPana Maternity. For example, there were wishes that patient´s operations

and allergies (two proposals) could be integrated into hospitals iPana directly. Two development proposals were hoped integration to the number of visits. There were wished fluent data transformation also towards maternity clinic. For example, the breastfeeding guidance provided by the maternity clinic to be shown in the hospitals, and on the other hand, the maternity clinic also should see hospitals' documentation on the subject. Also, there were proposals if the iPana and the patients´ blood sugar meters could be integrated.

There were some wishes about the integration errors. There were noticed that some data is grouped together so that if a midwife changes one part of the information the whole data changes (the color code of it) so that it seems that the hospital has documented it. There was one proposal to ease the discovery or legibleness of the data from the web-based preliminary information section. The family diseases wanted to be marked more clearly, for example, whose mother has the disease. Medication section integration challenges informed two respondents. There was noticed that the integration of the sections is confusing, and the patient should not be able to mark medicines if the mg amounts or precise units are not known.

6   CONCLUSIONS AND DISCUSSION

6.1   Reflection on results

The objective of the thesis was to map the midwives´ view of the iPana maternity´s digital solutions usability. There was viewed the iPana Maternity system´s three digital solutions: a web-based preliminary information platform, an electronic self-monitoring platform, and an electronic maternity card. The purpose of the thesis was to get answers to how the end-user midwives evaluate the usability of the solutions, which functions support work, and what should be improved in the system.

Most of the respondents had long work experience as a midwife. It can be concluded that respondents with long experience as a midwife have the user experience of the system over several years. These respondents have a wide view of the usability of the system. Many of the respondents did not have only one working unit in the TAUH. Kyytsönen et al. (2020) have mentioned that EHR´s support for user´s work varies in different working environments. It can be conducted that most respondents have the user experience of the system from different kinds of situations. The smallest number of respondents were received from the maternity policlinic and from those only two respondents had documented information in the self-measurements section. From all respondents 35% had not used the self-monitoring section. This reduces the legibility of analyzing the self-monitoring section´s results in this regard.

Most of the respondents could agree that learning how to use the iPana´s digital solutions was easy. It can be conducted learnability was supporting midwives´ work. The same kind of results Moghaddasi et al. (2017) had in the survey when evaluating nursing information systems' learnability. These results are better than the learnability results from the Nykänen et al. (2010) study. When viewing older midwives, 46 years and older, they evaluated more critically the web-based preliminary information platform´s learnability. However, older midwives did not clearly disagree with the ease of learning in all the sections, as might have been expected from previous studies results from Kinnunen et al. (2019).

From the efficiency feature, there could be seen supporting functions and development needs. Efficiency included finding information, noticing abnormal values (only self-monitoring section), terminology, performing routine tasks, and the integration or double documenting. Finding information and terminology could be seen as a supporting function of midwives' work. Noticing challenges of the abnormal blood sugar or blood pressure values in the self-monitoring section, challenges in performing routine tasks, and double documenting were not supporting midwives' work.

Most of the respondents evaluated that they can easily find the information they need from the sections. These results are in line whit the Hyppönen et al. (2018a) study. In acute units, the pregnancy emergency, and the delivery unit, the results were the same direction as average. Respondents could not agree on noticing the abnormal blood sugar or blood pressure values. Under half of all respondents agreed that they can easily notice abnormal blood sugar values. Little bit better results were from noticing the abnormal blood pressure values, half of the respondents agreed. The

maternity policlinic midwives evaluated better noticing abnormal values. This group was unfortunately small, so the results are not reliable.

The terminology of the digital solutions is strengthening usability and supporting midwives' work. It was evaluated clearly in all digital solutions. This finding agrees with earlier studies about how information systems, which nurses use, have succeeded in consistent and clear terminology (Moghaddasi et al. 2017). In the Hyppönen et al. (2018a) study nurses also evaluated that terminology of the EHR was supporting the ease of use of the system.

It can be concluded that the smooth performing of routine tasks does not support usability, as do some other aspects of efficiency. In each viewed section, the claim "Performing routine tasks with the section is easy and could be done without additional choices" received less than 70% agreeing answers. The self-monitoring section got the worst result, only 58 % of respondents agreed whit the claim. Results are in line whit the previous study from Hyppönen et al. (2018a). On the other hand, in this thesis, the results are better than in the Jansson et al. (2022) study.

About one-third of the responders evaluated that the information recorded in the self-monitoring section needed to be documented also elsewhere. This is a bit better result than in the Hyppönen et al. (2018a) study from Finnish nurses where double documenting was noticed as a development need in EHRs. From the web-based preliminary information platform section, 17% of the respondents thought the essential information recorded by the customer does not transfer by integration into the hospital´s iPana system. The same percentage from the electronic maternity card was 19%.

Most of the respondents agreed that after a break, it is easy to remember the use of the sections. This memorability result is in line whit the Moghaddasi et al. (2017) study. The web-based preliminary information platform´s memorability was seen hardest after a break. In the web-based preliminary information platform´s responses, there were more disagreeing answers about memorability. Especially those midwives disagreed who evaluated their technical skills as weak, but this group was rather small.

Over half of the respondents evaluated that they agree that they don't easily make mistakes when using the viewed iPana´s digital solutions. In the earlier studies from Moghaddasi et al. (2017) and Hyppönen et al. (2018a) were seen as more dissatisfied with the EHRs´ errors prevention. In this thesis, there were a lot of neutral answers to the error claim, is the error easy to fix.

When asked about their overall satisfaction, most of the respondents were satisfied whit the viewed sections. This is the opposite result of Topaz et al.'s (2016) international study, where satisfaction among nurses where low towards EHRs. In this thesis, the lowest satisfaction rate got the web-based preliminary information platform, and the highest was the electronic maternity card. When comparing the midwives, who had 0–5 years of working experience, to the midwives, who had 6 years or more working experience, it seemed that with less working experience gained midwives were more satisfied with all the sections. On the other hand, in the 0-5 years of experience group,

there were fewer respondents (n=7-8) than in the other group (n=17–28). These results are not directly comparable.

In the open-ended question, there were a lot of proposals about integration. Better integration from the hospital´s iPana and iPana Maternity was hoped. Integration problems need to be fixed so that seamless information flow is possible (Hyppönen et al. 2018a). Fluent data transformation was wished towards the patient side, for example, email reminders from the midwife´s messages to the patient. This was mentioned only in one answer, but a lack of support from EHR for cooperation was noticed in the Kyytsönen et al. (2020) study. There were also proposed color codes to ease this noticing the abnormal values. The same kind of proposal, to attract the user's attention, if necessary, has Petersen et al. (2019) suggested. Proposals were also made to avoid medication integration errors. In the Kaipio et al. (2020) study nurses' dissatisfaction with EHR´s capacity to prevent errors with medication was also noticed. In the Hyppönen et al. (2018a) study, deficiencies in the EHRs´ medication list were identified as a development target.

In conclusion, the most supporting functions of the iPana´s digital solutions, for midwives' work, are learnability and memorability. Efficiency supported usability in some parts. Finding information from the sections and terminology of the solutions was supporting midwives' work. The main improvement needs of the digital solutions were about some parts of the efficiency. There could be noticed improvement needs in performing routine tasks, integration, noticing abnormal blood sugar and/or pressure values, and the self-monitoring section´s double documenting challenges.

6.2   The ethics of the research

The Finnish National Board on Research Integrity TENK has defined responsible conduct of research. According to this definition, honesty, meticulousness, and accuracy must be conducted at every stage of the research. The results of the research must be published openly and responsibly. In addition, the researcher should respect the achievements of other researchers and refer to them appropriately. (The Finnish National Board on Research Integrity TENK 2021.) This thesis has followed the ethical rules and data protection guidelines of the Finnish National Board on Research Integrity TENK, the Savonia University of Applied Sciences, and the Pirkanmaa Hospital District.

Before the research starts, the rights, responsibilities, and obligations of all parties, as well as questions concerning the preservation of materials and access rights, will be agreed upon (The Finnish National Board on Research Integrity TENK 2021). The supervision and projection agreement for the thesis was concluded between the thesis author, the Savonia University of Applied Sciences´ guiding teacher, Elisa Snicker, and the Pirkanmaa Hospital District in the fall 2021.

Responsible research activities include that the necessary research permits have been obtained properly (The Finnish National Board on Research Integrity TENK 2021). A research permit (case ID: 6226/2020) (Appendix 1) was obtained from the TAUH´s Head Nurse of Teaching Susanna Teuho. The Head Nurse of the Obstetric Department, Terhi Virtanen, was informed about the thesis.

Responsible research activities must consider data protection issues (The Finnish National Board on Research Integrity TENK 2021). The processing of research data must be carried out in accordance with trust and anonymity (Eskola & Suoranta 1998). The benefit of the digital questionnaire is that the respondents stay anonymous (Vilkka 2021b). In the attachment with the survey link, respondents got the privacy statement (Appendix 4). The answering was voluntary and anonymous. Only the thesis author had access to the research results.

There were no sources of funding for the study. The thesis author has no employment relationship with the Pirkanmaa Hospital District or CSAM. The thesis author used iPana EHR in 2009 at the North Karelia Hospital for a short time. The strength of the thesis was the objectivity. The author of the thesis has no user experience with all the digital solutions examined, and the experience with the iPana system dates back more than 10 years. Since the organization is not a workplace of the thesis author, there were no ethical problems related to the implementation of the research. An objective analysis was therefore possible.

6.3   The validity and reliability of the research

The validity refers to the ability of a meter or research method to measure research questions (Kankkunen & Vehviläinen-Julkunen 2017, 189). The quantitative survey worked well on the thesis´ research issues. Questionnaires are seen as useful when collecting information about the end-user's perception of the EHR. Subjective evaluation means the user´s perception, of how useful, usable, and satisfactory the use of a system is. A user´s subjective evaluation of a system is often equated with all system usability evaluations. This can give the impression that the usability assessments are only subjective and so on unreliable, and useless to improve systems. Subjective assessment is an important part of usability, but it should not be the only meter. (Zhang & Walji 2011.) It can be concluded that the strength of the method used in the thesis is to bring out the professional end-user's view.

Validity is affected by how much data is missing, and what information the meter does not provide (Vilkka 2021b). The questionnaire was created based on Nielsen's usability definition. The thesis author did not have deep experience in the viewed digital solutions, so it is possible that the questions remained superficial. Would the questions have been better formulated if there had been a view of the use? On the other hand, the open-ended question allowed the respondent to highlight areas for development. Through the open-ended question, there was gained more information from the respondents. The gained results provided answers to research questions mainly. The weakness, of the method used in the thesis, is that it does not give an overall picture of the system´s usability.

There were many neutral answers to error claims, is the errors easy to fix. If respondents could not answer the question, it could be a sign that the question is poorly shaped or that question is too hard to answer (Vilkka 2021b, 109–113). Also, the result becomes unreliable if the respondent does not think as the researcher assumed (Vilkka 2019b). It could be concluded that the research is mainly valid.

If there would have been wanted to evaluate how the user works when using the system and not just ask for an opinion about the usability with a survey, for example, a heuristic assessment should have been used. This, however, would not have been possible for the thesis with existing resources and this would have required special expertise from the thesis author as well. Also, heuristic evaluation is usually used during the design process. Heuristic evaluation is a usability engineering method for finding the usability challenges in a user interface. Heuristic evaluation includes evaluators, which examine the interface and evaluate it by usability principles which are called heuristics. (Nielsen 1994.) Ellsworth et al. (2017) viewed 120 usability studies in a systematic review and most of them used Nielsen´s Usability Heuristics as the basis for the assessment of the heuristic method was used. (Ellsworth et al. 2017.) Nielsen´s Usability Heuristics refers to Nielsen's Usability Heuristics 10 rules, which include five usability goals (Nielsen 2020). These five usability goals are the ones that have been used as the theoretical basis for this thesis. This suggests that the usability definitions used in this thesis and the basis for forming the questionnaire are generally considered to reflect usability.

The reliability of the study refers to the accuracy of the results (Kankkunen & Vehviläinen-Julkunen 2017, 189-190). The response rate to the questionnaire was 37%. Heikkilä (2014) mentions that survey respondents are usually different from those who did not respond. Refusal rate changes the results (Heikkilä 2014). The length of the survey may have affected the number of respondents. Kankkunen and Vehviläinen-Julkunen (2017, 120-121) mention that the length of the digital survey and the time it takes to fill it can be a challenge to answer the survey while working. There were altogether 37 questions, but this was considered at the design stage of the survey. For the most part, the questions were repeating each other when moving on in the next section in the questionnaire. This was assumed to make it easier to answer as the survey progressed, as the respondent would already be "familiar" with the questions from the previous sections.

The reliability of the thesis is enhanced by the fact that an email questionnaire was sent to all TAUH midwives. Everyone should have the opportunity to respond to the study (Vilkka 2021b). The reliability of the study is not sufficient for some groups´ results, which were viewed independently basis on the theory base. An in-depth, reliable analysis could not be carried out between different units due to the small sample sizes. If the sample sizes between the groups are parallel, the data is more representative (Heikkilä 2014). In the open-ended question, the number of responses was small, and the results did not repeat. The downside of open-ended question is that it is easily left unanswered (Heikkilä 2014). One sign of the adequacy of the material is its saturation, the material begins to repeat itself (Eskola & Suoranta 1998). Answering an open-ended question was voluntary and there were asked for development proposals. This allowed for very different answers, and it was not assumed that the answers would begin to saturate. The gained development proposals were considered relevant and were therefore included in the findings of the research.

6.4   Proposals for measures to be taken and topics for further research

EHRs have united as a part of health care and are working as one of the professionals´ daily tools. The PHPs make it possible for patients to be more involved in the care. The usability of these systems is more vital than ever in this rapidly changing environment. The digital tools should support professionals in their work and create an opportunity for seamless cooperation between patients and professionals. This thesis provided an overview of midwife end-users perceptions of the usability of iPana Maternity digital solutions. End-user midwives´ view has not been examined from the system since the installation phase. Globally and nationally, only a few of the usability studies of healthcare information systems, have concentrated on nursing information systems.

The results of this thesis can be used in the system´s development work. This benefits the client organization, the Pirkanmaa Hospital District, but also other Finland delivery units where iPana is in use. Improving the development needs highlighted in the thesis would streamline and speed up the work of midwives. This could increase the professionals´ well-being at work and improve the quality of care. Changes should be made to make it easier to notice abnormal values by color codes. Integration should be improved, for example, the number of visits should be transferred directly. Streamlining routine tasks and minimizing double documentation requires closer studies. Consideration should be given to what routine tasks could be simplified and how. In addition, should be found out all information is double documented that the modifications can be made.

Further research on the usability topic is needed. The experiences of midwives in the maternity policlinic were not comprehensive. Only two of the maternity policlinic respondents documented information in the self-monitoring section. This should be looked at in greater depth, as they use the self-monitoring section for the pathway to guide patients. For example, it would have been interesting to know how they evaluate performing a routine task in the self-monitoring section. Also, in-depth analysis and evaluation could not be carried out between the different units due to the small sample sizes. It would have been interesting to see more reliably how the usability depends on whether the work unit is acute or not.

The web-based preliminary information platform received criticism, especially from midwives who rated their technical skills as poor. End-users could benefit from properly targeted deployment training with an assessment of user skills prior to training. Further research should be carried out into the most effective implementation of deployment training, and adequate resources should be provided for properly implemented training.

In general, the purchaser of EHRs should be aware that the needs for the system may change in the future and some of the usability challenges will be revealed much later after deployment. Continuous development and usability assessment will continue to be important in the years to come. Manufacturers of information systems should continue to commit to reviewing usability after deployment, and the system should be customized to meet the professional end-user requirements. To achieve this, a national recommendation should be drawn up, and healthcare organizations and system manufacturers should commit to following it.

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APPENDIX 1: RESEARCH PERMIT

Pirkanmaan sairaanhoitopiiri		viranhaltijapäätös	12 ()
Opetusylihoitaja, henkilöstö- ja			**§ 81**
asiakaspalvelut vastuualue, Palvelukeskus		16.11.2021	**/2021**
Tieteellinen tutkimus			

Asiakirja on sähköisesti allekirjoitettu asianhallintajärjestelmässä. Pirkanmaan sairaanhoitopiiri 16.11.2021 klo 18:27. Allekirjoituksen oikeellisuuden voi todentaa kirjaamosta.

6226/2020 Lupa AMK opinnäytetyölle

Savonia ammattikorkeakoulun The Master`s Programme in Digitall Health tutkinto- ohjelman opiskelija Anna-Leena Karvonen hakee lupaa opinnäytetyönsä toteuttamiseksi yhteistyössä Pirkanmaan sairaanhoitopiirin, Synnytysten,- ja naistentautien vastuualueen kanssa.

Opinnäytetyön työnimi on " iPana tietojärjestelmän digitaalisten ratkaisujen käytettävyys ".

Opinnäytetyön tarkoituksena on tutkia TAYS:n äitiyspoliklinikalla, raskauspäivystyksessä, raskaana olevien osastolla ja synnytyssalissa työskentelevien kätilöiden kokemuksia iPana tietojärjestelmän käytettävyydestä. Opinnäytetyön avulla pyritään selvittämään kuinka loppukäyttäjäkätilöt arvioivat iPana järjestelmän digitaalisten ratkaisujen käytettävyyttä ja millaisia kehityskohteita kätilöt näkevät tietojärjestelmässä.

Opinnäytetyön aineisto kerätään sähköisenä kyselynä ja kohdejoukon muodostavat em yksiköiden kätilöt.

Opinnäytetyön toteuttamisesta on sovittu yhteistyössä työelämätahon kanssa.

Liitteet:

1 Lupahakemus_Karvonen Anna-Leena.pdf

PÄÄTÖS

Päätän myöntää luvan opinnäytetyölle seuraavilla edellytyksillä:

- opinnäytetyössä yhteistyötahona mainitaan Pirkanmaan sairaanhoitopiiri ellei työelämätahon kanssa toisin sovita

- opinnäytetyöhön osallistujia informoidaan tutkimusprotokollan mukaisesti

- opinnäytetyön tuloksia raportoitaesa varmistetaan, että yksittäinen vastaaja ei ole tunnistettavissa

- opinnäytetyöstä toimitetaan raportti työelämäyhteistyötaholle ja opinnäytetyön tuloksista esittämisestä sovitaan erikseen sen valmistumisvaiheessa - opinnäytetyön valmistumisesta informoidaan opetusylihoitajaa.

Päätöksen peruste

Hallintoylihoitajan päätöspöytäkirja 1§/2010

Pirkanmaan sairaanhoitopiiri		Viranhaltijapäätös	22 ()
Opetusylihoitaja, henkilöstö- ja			**§ 81**
asiakaspalvelut vastuualue, Palvelukeskus		16.11.2021	**/2021**

Tieteellinen tutkimus

Asiakirja on sähköisesti allekirjoitettu asianhallintajärjestelmässä. Pirkanmaan sairaanhoitopiiri 16.11.2021 klo

TIEDOKSI

Opiskelija Anna-Leena Karvonen, ohjaava opettaja Elisa Snicker, ylihoitaja Terhi Virtanen, osastonhoitajat Tytti Hyytiä, Sari Antikainen ja Taina Lampu, hoitotyön kliininen asiantuntija Sanna-Kaisa Kukko, koulutuskoordinaattori Sari Vehmas

Allekirjoitus

Susanna Teuho, opetusylihoitaja

APPENDIX 2: COVER LETTER

TIEDOTE OPINNÄYTETYÖSTÄ

Opinnäytetyö – iPana tietojärjestelmän digitaalisten ratkaisujen käytettävyys

(The Usability of the Digital Solutions in the iPana EHR)

Pyydämme teitä osallistumaan tähän opinnäytetyöhön, jossa tutkitaan TAYS:n äitiyspoliklinikalla, raskauspäivystyksessä, raskaana olevien osastolla ja synnytyssalissa työskentelevien kätilöiden kokemuksia iPana tietojärjestelmän käytettävyydestä. Tämä tiedote kuvaa tutkimusta ja Teidän mahdollista osuuttanne siinä. Perehdyttyänne rauhassa tähän tiedotteeseen voitte esittää kysymyksiä opinnäytetyöstä opinnäytetyön tekijälle, tiedotteen lopusta löydät yhteystiedot.

Osallistumalla tähän sähköiseen kyselyyn hyväksytte samalla, että tässä kyselyssä syntyviä henkilörekisteritietojanne voidaan käyttää tietosuojaselosteessa mainituissa tarkoituksissa. Hyväksyminen on vapaaehtoista.

Opinnäytetyön tarkoitus

Tämän opinnäytetyön tarkoituksena on tutkia TAYS:n äitiyspoliklinikalla, raskauspäivystyksessä, raskaana olevien osastolla ja synnytyssalissa työskentelevien kätilöiden kokemuksia iPana tietojärjestelmän käytettävyydestä. Opinnäytetyön avulla pyritään selvittämään kuinka loppukäyttäjäkätilöt arvioivat iPana järjestelmän digitaalisten ratkaisujen käytettävyyttä ja millaisia kehityskohteita kätilöt näkevät tietojärjestelmässä.

Opinnäytetyön toteuttamiselle on Pirkanmaan sairaanhoitopiirin opetusylihoitajan lupa.

Opinnäytetyön kulku

Tutkimusaineisto kerätään sähköisellä Webropol kyselyllä marraskuun 2021-helmikuun 2022 välisenä aikana.

Kerättävät henkilöiden yksilöinti- ja tunnistustiedot ovat: työskentely-yksikkö/-yksiköt, ikä, työvuodet kätilönä, työvuodet iPana tietojärjestelmän käyttäjänä. Yksittäistä vastaajaa ei voida tunnistaa.

Opinnäytetyön on tarkoitus valmistua syksyllä 2022.

Opinnäytetyöhön liittyvät hyödyt sekä mahdolliset riskit ja haitat

On mahdollista, että tähän opinnäytetyöhön osallistumisesta ei ole teille hyötyä. Tutkimuksessa saatua tietoa voidaan käyttää iPana tietojärjestelmän kehitykseen.

Henkilötietojen käsittely ja tietojen luottamuksellisuus

Henkilötietojanne käsitellään ylläkuvattua opinnäytetyötä varten. Henkilötietojen käsittelyn oikeudellisena perusteena on yleinen etu ja tietoinen suostumus.

Opinnäytetyössä rekisteriin tallennetaan vain opinnäytetyön tarkoituksen kannalta välttämättömiä henkilötietojanne. Teistä kerättyjä tietoja käsitellään luottamuksellisesti henkilötietojen käsittelyä koskevan lainsäädännön edellyttämällä tavalla. Opinnäytetyössä yksittäisen tutkimushenkilön nimi ja yhteystiedot korvataan yksilöllisellä tunnistekoodilla. Teidän tietonne säilytetään tutkimusaineistossa koodattuna ja teihin viitataan niissä vain tunnistekoodilla. Tutkimusaineisto ja teidän tietonne sen osana myös analysoidaan koodattuina, jolloin yksittäinen henkilö ei ole niistä suoraan tunnistettavissa ilman erillistä koodiavainta. Tätä koodiavainta eli tietoa, jonka avulla yksittäisen tutkittavan henkilöllisyys ja hänen tutkimustietonsa voidaan yhdistää toisiinsa, säilyttää rajattu ja ennalta määritelty opinnäytetyön tekijä (Anna-Leena Karvonen). Näitä tietoja ei anneta opinnäytetyön ulkopuolisille henkilöille. Lopulliset tulokset raportoidaan siten, että yksittäisen tutkittavan tunnistaminen ei ole mahdollista tulosten julkaisuista tai selvityksistä.

Kaikki tietojanne käsittelevät tahot ja henkilöt ovat salassapitovelvollisia.

Henkilötietojenne säilytys: Kyselyn kautta sähköisesti antamianne tutkimustietoja säilytetään Webropol-kyselytyökalun pilvipalvelussa ja niitä pääsee tarkastelemaan vain tämän opinnäytetyön tekijä. Webropol on SaaS-palvelu, jonka palvelimet sijaitsevat Telia Inmics-Nebula Oy:n korkean tietoturvatason palvelinkeskuksissa Helsingissä. Kaikki palvelun sisältämä tieto on tallennettu EU:n sisällä eikä sitä missään tilanteessa luovuteta tai käsitellä EU:n ulkopuolelle.

Teitä koskevien tietojen säilytyksestä vastaa Anna-Leena Karvonen. Välittömästi opinnäytetyön valmistuttua kerätyt tiedot hävitetään. Opinnäytetyön yhteydessä kerättyjä tietoja säilytetään Webropolissa korkeintaan 1.5.2023 asti.

Vapaaehtoisuus

Opinnäytetyöhön osallistuminen on vapaaehtoista ja voit keskeyttää osallistumisen koska tahansa syytä ilmoittamatta. Voit keskeyttää osallistumisen missä tahansa opinnäytetyönvaiheessa ennen

sen päättymistä ilman, että siitä koituu sinulle mitään haittaa. Voit myös peruuttaa tämän suostumuksen. Jos päätät peruuttaa suostumuksesi, tai osallistumisesi keskeytyy jostain muusta syystä, siihen mennessä kerättyjä tietoja käytetään osana aineistoa.

Henkilötietojen käsittelyyn liittyvät oikeudet

Teillä on oikeus saada informaatio teistä kerätyistä tiedoista, mihin niitä on käytetty, kenelle niitä on luovutettu ja mitä tarkoitusta varten ja pyytää tietojenne oikaisemista tai täydentämistä esimerkiksi, jos havaitsette niissä virheen tai ne ovat puutteellisia tai epätarkkoja. Teillä on myös oikeus pyytää tietojenne poistamista opinnäytetyöstä ("oikeus tulla unohdetuksi") tai niiden käytön rajoittamista ja vastustaa käsittelyä ilmoittamalla siitä tutkimushenkilökunnalle.

Teillä on oikeus ottaa yhteyttä Savonian tietosuojavastaavaan: Matti Kuosmanen

matti.kuosmanen@savonia.fi, 044785 636.

Teillä on oikeus tehdä valitus valvontaviranomaiselle, jos katsotte, että henkilötietojenne käsittelyssä rikotaan EU:n yleistä tietosuoja-asetusta (EU) 2016/679. Suomessa valvontaviranomainen on tietosuojavaltuutettu.

Tietosuojavaltuutetun toimisto

Ratapihantie 9, 6. krs, 00520 Helsinki, PL 800, 00521 Helsinki

Puhelinvaihde: 029 566 6700

Sähköposti: tietosuoja@om.fi

Opinnäytetyön kustannukset ja taloudelliset selvitykset

Opinnäytetyöhön osallistumisesta ei makseta palkkiota.

Opinnäytetyön tuloksista tiedottaminen

Opinnäytetyö julkaistaan palvelussa

Lisätiedot ja opinnäytetyön tekijöiden yhteystiedot

Mahdollisia kysymyksiä opinnäytetyöstämme pyydämme teitä esittämään Anna-Leena Karvoselle, anna-leenamaria.karvonen@edu.savonia.fi

APPENDIX 3: QUESTIONNAIRE

Ipana Äitiys Käytettävyyskysely

Hyvä tutkimukseen osallistuja!

Terveydenhuoltoala on muutoksessa. Digitaaliset palvelut ovat liittyneet osaksi kätilön työtä. Asiakkaat voivat entistä enemmän osallistua hoitoonsa, tuottaa tietoa omasta terveydestään ja tämä tieto voidaan liittää osaksi potilastietoja. Digitaaliset ratkaisut tukevat tätä muutosta. Viime vuosina on herätty terveydenhuollon tietojärjestelmien käytettävyyden haasteisiin. Tämän kyselytutkimuksen tarkoitus on selvittää iPana Äitiys tietojärjestelmän käytettävyyttä kätilöiden näkökulmasta. Tässä kyselyssä kirjaamisella tarkoitetaan kirjaamista suoraan iPana Äitiyteen (ei sairaalan iPanaan ja tietojen siirtoon integraatiolla). Kysely on suunnattu äitiyspoliklinikalla, raskauspäivystyksessä, raskaana olevien osastolla ja synnytyssalissa työskenteleville kätilöille Tampereen Yliopistollisessa sairaalassa.

Kyselyllä saadaan arvokasta tietoa iPana Äitiys tietojärjestelmän hyödyistä ja haasteista. Osallistumalla tähän sähköiseen kyselyyn hyväksytte samalla, että kyselyssä syntyviä henkilörekisteritietojanne voidaan käyttää tietosuojaselosteessa mainituissa tarkoituksissa. Osallistuminen on vapaaehtoista. Vastaukset näkyvät opinnäytetyön tekijälle anonyymeina.

Tutkimuksen laatija:

Anna-Leena Karvonen

YAMK-opiskelija, Master´s Programme in Digital Health, Savonia-ammattikorkeakoulu

anna-leenamaria.karvonen@edu.savonia.fi

Vastaajan perustiedot

1. Ikä vuosina

25 tai vähemmän

26–35

36–45

46–55

56 tai enemmän

2. Työvuodet kätilönä

0–5

6 tai enemmän

3. Työskentely –yksikkö/-yksiköt (voit valita yhden tai useamman)

äitiyspoliklinikka

raskauspäivystys

synnytyssali

raskaana olevien osasto

4. Yleinen tekninen osaamiseni on erittäin hyvällä tasolla

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

iPana Äitiyden Esitiedot-osio

5. Esitieto-osion käyttö

Olen käyttänyt osiota asiakkaan tietojen tarkasteluun

Olen käyttänyt osiota asiakkaan tietojen kirjaamiseen

Olen käyttänyt osiota asiakkaan tietojen tarkasteluun ja kirjaamiseen

En ole käyttänyt Esitieto-osiota (mikäli valitset tämän vaihtoehdon, siirryt automaattisesti Omat seurannat -osion kysymyksiin)

6. Esitiedot-osion käytön opettelu oli helppoa

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

7. Esitieto-osiosta löydän helposti tarvittavat tiedot

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

8. Esitiedot-osiossa käytetty termistö on selkeää

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

9. Rutiinityötehtävien hoitaminen Esitiedot-osiossa sujuu helposti ilman ylimääräisiä valintoja

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

10. Esitiedot-osioon asiakkaan kirjaamat olennaiset tiedot siirtyvät integraatiolla sairaalan iPana järjestelmään

täysin eri mieltä

osittain eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

11. Käyttötauon jälkeen oli helppo muistaa Esitiedon-osion käyttö

täysin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

12. Esitiedot-osion käytössä en tee helposti virheitä

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

13. Jos teen virheen Esitiedot-osion käytössä, on virhe helppo korjata

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

14. Olen tyytyväinen Esitiedot-osioon

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

iPana Äitiyden Omat seurannat -osio

15. Omat seurannat -osion käyttö

Olen käyttänyt osiota asiakkaan tietojen tarkasteluun

Olen käyttänyt osiota asiakkaan tietojen kirjaamiseen

Olen käyttänyt osiota asiakkaan tietojen tarkasteluun ja kirjaamiseen

En ole käyttänyt Omat seurannat -osiota (mikäli valitset tämän vaihtoehdon, siirryt automaattisesti sähköisen neuvolakortin kysymyksiin)

16. Omat seurannat -osion käytön opettelu oli helppoa

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

17. Omat seurannat -osiosta löydän helposti tarvittavat tiedot

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

18. Omat seurannat -osiossa huomaan helposti poikkeavat verensokeriarvot

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

19. Omat seurannat -osiossa huomaan helposti poikkeavat verenpainearvot

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

20. Omat seurannat -osiossa käytetty termistö on selkeää

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

21. Rutiinityötehtävien hoitaminen Omat seurannat -osiossa sujuu helposti ilman yli-määräisiä valintoja

täysin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

22. Omat seurannat -osion kirjattuja tietoja ei tarvitse kirjata mihinkään muualle (tuplakirjaus)

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

23. Käyttötauon jälkeen on helppo muistaa Omat seurannat -osion käyttö

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

24. Omat seurannat -osion käytössä en tee helposti virheitä

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

25. Jos teen virheen Omat seurannat -osion käytössä, on virhe helppo korjata

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

26. Olen tyytyväinen Omat seurannat -osioon

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

iPana Äitiyden sähköinen neuvolakortti

27. Sähköisen neuvolakortin käyttö

Olen käyttänyt osiota asiakkaan tietojen tarkasteluun

Olen käyttänyt osiota asiakkaan tietojen kirjaamiseen

Olen käyttänyt osiota asiakkaan tietojen tarkasteluun ja kirjaamiseen

En ole käyttänyt osiota (mikäli valitset tämän vaihtoehdon, siirryt automaattisesti kyselyn loppuun)

28. Sähköisen neuvolakortin käytön opettelu oli helppoa

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

29. Sähköisestä neuvolakortista löydän helposti tarvittavat tiedot

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

30. Sähköisessä neuvolakortissa käytetty termistö on selkeää

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

31. Rutiinityötehtävien hoitaminen sähköisen neuvolakortin kanssa sujuu helposti ilman ylimääräisiä valintoja

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

32. Sähköiseen neuvolakorttiin kirjatut olennaiset tiedot siirtyvät integraatiolla sairaalan iPana järjestelmään

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

33. Käyttötauon jälkeen on helppo muistaa sähköisen neuvolakortin käyttö

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

34. Sähköisen neuvolakortin käytössä en tee helposti virheitä

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

35. Jos teen virheen sähköisen neuvolakortin käytössä, on virhe helppo korjata

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

36. Olen tyytyväinen sähköiseen neuvolakorttiin

täysin eri mieltä

jokseenkin eri mieltä

ei samaa eikä eri mieltä

jokseenkin samaa mieltä

täysin samaa mieltä

37. Mitä kehittämiskohteita näet iPana Äitiys järjestelmässä?

APPENDIX 4: PRIVACY STATEMENT

1 Tutki-muksen nimi	iPana tietojärjestelmän digitaalisten ratkaisujen käytettävyys (The Usability of the Digital Solutions in the iPana EHR)
2a Rekiste-rinpitäjä /-t	Nimi Anna-Leena Karvonen
	Osoite Kevättömänpolku 24
	Muut yhteystiedot (esim. puhelin virka-aikana, sähköpostiosoite) 71800 Siilinjärvi
2b Yhteisre-kisterin-pitäjien tehtä-vienjako	Yhteisrekisterinpitäjien yhdessä määrittelemä tehtävienjako:
3 Yhteys-tieto rekisteriä koske-vissa asi-oissa Suomessa	Nimi ja yhteystiedot Anna-Leena Karvonen Kevättömänpolku 24, 71800 Siilinjärvi 050-3794819 anna-leenamaria.karvonen@edu.savonia.fi
4 Rekiste-rinpitäjän tietosuo-javas-taava	Nimi ja yhteystiedot Matti Kuosmanen matti.kuosmanen@savonia.fi, 044785 636

5 Tutkimus-rekisterin nimi	iPana tietojärjestelmän digitaalisten ratkaisujen käytettävyys kysely
6a Henkilö-tietojen käsittelyn tarkoitus	- Rekisterin sisältämiä henkilötietoja käsitellään tutkimusaineistona tieteellisessä tutkimuksessa. Henkilötietoja tulee käsitellä vain siinä laajuudessa ja tarkoituksessa kuin on kyseisen tutkimussuunnitelman suorittamiseksi välttämätöntä. - Lyhyt kuvaus tutkimuksen tarkoituksesta: Tarkoitus selvittää TAYS:n äitiypoliklinikalla, raskauspäivytyksessä, raskaana olevien osastolla ja synnytyssalissa työskentelevien kätilöiden kokemuksia iPana järjestelmän sähköisen neuvolakortin, Omat seurannat-osion ja sähköisten esitietojen käyttevyydestä
6b Henkilö-tietojen käsitellyn oikeuspe-ruste	- **Tässä tutkimuksessa henkilötietojen käsittely perustuu tietosuoja-asetuksen 6 artiklan seuraaviin kohtiin (valitse sopivat):** - ☒ Artikla 6, 1a: Rekisteröidyn antama yksiselitteinen suostumus ☐ Artikla 6, 1b: Rekisteröidyn kanssa tehdyn sopimuksen täytäntöön-pano ☐ Artikla 6, 1c: Rekisterinpitäjän lakisääteinen velvoite ☒ Artikla 6, 1e: Yleistä etua koskevan tehtävän suorittaminen tai rekisterinpitäjälle kuuluvan julkisen vallan käyttö ☐ Artikla 6, 1f: Rekisterinpitäjän tai kolmannen osapuolen oikeutettujen etujen toteuttaminen **Lisäksi tässä tutkimuksessa arkaluontoisten henkilötietojen käsittely perustuu tietosuoja-asetuksen 9 artiklan seuraaviin kohtiin (valitse sopivat):**

		-
		☒ Artikla 9, 2a: Rekisteröitävän antama nimenomainen suostumus arkaluontoisten tietojen käsittelyyn
		☐ Artikla 9, 2g: Tärkeää yleistä etua koskeva syy unionin oikeuden tai jäsenvaltion lainsäädännön nojalla
		☐ Artikla 9, 2i: Kansanterveyteen liittyvä yleinen etu
		☒ Artikla 9, 2j: Yleisen edun mukainen arkistointitarkoitus taikka tieteellinen ja historiallinen tutkimustarkoitus tai tilastollinen tarkoitus
7 **Tietolähteet ja niistä kerättävät henkilötietoryhmät**		Tutkimusaineisto kerätään seuraavista tietolähteistä. Yksilöi, mitä henkilötietoryhmiä kustakin tietolähteestä kerätään: Tietolähde: tutkitavat kätilöt (synnytyssalissa, raskaana olevien osastolla ja raskauspäivystyksessä työskentelevät) Kerättävät henkilöiden yksilöinti- ja tunnistustiedot: työskentely-yksikkö, ikä, työvuodet kätilönä, työvuodet iPana tietojärjestelmän käyttäjänä
8 **Tutkimukseen osallistuvat tutkimuskeskukset ja tietojen vastaanottajat**		Tietoja käsitellään seuraavissa tutkimuskeskuksissa tai siirretään tai luovutetaan seuraaville vastaanottajille tai vastaanottajaryhmille: Tutkimusaineistoa käsittelee ainoastaan opinnäytetyön tekijä ja tarkastelussa voi olla apuna Savonia amk:n nimeämä ohjaava opettaja. Tutkimusaineistoa ei jaeta muualle.

9 Tutkimus-tulosten julkaise-minen	Julkaisutoiminnan yhteydessä tutkimusaineistoa saatetaan siirtää julkaisijan tietokantaan tutkimustulosten oikeellisuuden varmistamiseksi. Tutkimustuloksia on tarkoitus julkaista: ☐ kotimaisissa lehdissä ☐ eurooppalaisissa lehdissä ☐ EU /ETA-alueen ulkopuolisissa lehdissä ☐ verkkojulkaisuissa ☒ opinnäytetöiden, kuten väitöskirjojen, julkaisuissa ☒ muualla, missä www.theseus.fi ☐ tuloksia ei julkaista

10 Tietojen ja näyt-teiden siirto EU:n tai ETA:n ul-kopuo-lelle	Mikäli tietoja siirretään EU:n ja ETA-alueen ulkopuolisiin maihin, täydennä tarvittavat tiedot.

Maa ja organisaatio	Mitä tietoja ja missä muodossa	Mitä tarkoitusta varten

	Käytettävät suojatoimet: ☐ Tietoja / näytteitä siirretään kohdemaahan, joka Euroopan komission tietosuojan riittävyyttä koskevan päätöksen mukaan varmistaa riittävän tietosuojan tason. Maat, joita suojatoimi koskee: ☐ Tietoja / näytteitä siirretään kohdemaahan, jolla ei ole Euroopan komission tietosuojan riittävyyttä koskevaa päätöstä. Asianmukaiset suojatoimet siirroissa toteutetaan käyttäen tietojensiirtosopimuksessa Euroopan komission hyväksymiä vakiolausekkeita, joihin molemmat osapuolet sitoutuvat. Maat, joita suojatoimi koskee: ☐ Muu tietosuoja-asetuksen V-luvun mukainen suojatoimi: Maat, joita suojatoimi koskee:			
11 Tutkimuksen kesto ja henkilötietojen säilytysaika	Henkilötietojen kokonaissäilytysaika koostuu tutkimuksen kestosta, mahdollisista lakisääteisistä säilytysajoista ja mahdollisesta yleisen edun mukaisesta arkistoinnista. Tutkimuksen suunniteltu kesto: 1.10.2021-1.5.2023 (marraskuun 2021-helmikuun 2022 välisenä aikana kyselytutkimus) (alkamis- ja päättymispäivä)			

		Henkilötietojen säilytysaika tutkimuksen päättymisen jälkeen: 1 vuotta
12 **Henkilö-** **tietojen** **suojaus-** **toimenpi-** **teet tutki-** **muksen** **aikana**		Tietoja käsitellään pseudonyymeina. Vastaajat vastaavat sähköpostitse lähetetyn Webropol kyselylinkin kautta. Vastaukset tallentuvat Webropol järjestelmään ilman sähköpostiosoitetta. Webropolista vastauksia pääsee tarkastelemaan ainoastaan opinnäytetyön tekijä. Webropol on SaaS-palvelu, jonka palvelimet sijaitsevat Telia Inmics-Nebula Oy:n korkean tietoturvatason palvelinkeskuksissa Helsingissä. Kaikki palvelun sisältämä tieto on tallennettu EU:n sisällä eikä sitä missään tilanteessa luovuteta tai käsitellä EU:n ulkopuolelle. Tietoja käsittelee opinnäytetyön tekijä, joka on sitoutunut noudattamaan tutkimuksen toteuttamisessa tutkimuseettisen neuvottelukunnan hyvän tieteellisen käytännön ohjeita sekä pitämään salassa kaikki tutkimuksessa käsiteltävät henkilötiedot. Arkaluonteisen tiedon käsittelyssä on huomioitu erityisen korkea salassapitointressi. Tutkimukseen käytettäväksi annetut tiedot eristetään selkeästi omaksi kokonaisuudekseen. Pääsyä aineistoon kontrolloidaan ja valvotaan muun muassa rajoittamalla Webropoliin pääsyä. Sisäänkirjautuminen tapahtuu salasanalla ja käyttäjätunnuksella, jotka tähän aineistoon ovat ainoastaan opinnäytetyön tekijällä.
13 **Tutkitta-** **van oi-** **keudet**		
13a **Suostu-** **mus tut-** **kimuk-**		**Oikeus peruuttaa suostumus tutkimukseen osallistumiseen** Tutkittavalla on oikeus peruuttaa suostumuksensa kliiniseen lääketieteelliseen tutkimukseen osallistumiseen. Peruuttamista ennen kerättyjä henkilötietoja voidaan käyttää osana tutkimusaineistoa, mikäli

seen osal-listumi-seen		tämä on välttämätöntä ja tästä on informoitu tutkittavaa ennen suostumuksen antamista. Jos tutkittava haluaa peruuttaa suostumuksensa tutkimukseen osallistumisesta, tutkittava voi ilmoittaa tästä tutkimushenkilökunnalle.
13b **Henkilö-tietojen käsitte-lyyn liitty-vät oikeu-det**		Tutkittavalla on tutkimukseen osallistuessa käytössään tietosuojalainsäädännön mukaisia oikeuksia. Näiden oikeuksien laajuuteen vaikuttaa henkilötietojen käsittelyn oikeusperuste (kts. kohta 6b). ☒ **Oikeus saada tieto henkilötietojensa käsittelystä** Tutkittavalla on oikeus saada tietoa henkilötietojensa käsittelyyn liittyvistä toimenpiteistä. ☒ **Oikeus saada pääsy tietoihin** Tutkittavalla on oikeus saada tieto siitä, käsitelläänkö henkilötietoja ja mitä henkilötietoja tutkimuksessa käsitellään. Tutkittava voi myös halutessaan pyytää jäljennöksen käsiteltävistä henkilötiedoista. Jäljennöksen toimittaminen ei saa vaikuttaa haitallisesti muiden oikeuksiin ja vapauksiin. ☒ **Oikeus tietojen oikaisemiseen** Jos käsiteltävissä henkilötiedoissa on epätarkkuuksia tai virheitä, tutkittavalla on oikeus pyytää niiden oikaisua tai täydennystä. Mikäli tutkittava kiistää henkilötietojen paikkansapitävyyden, voi hän vaatia tietojen käsittelyä rajoitettavan ajaksi, jonka kuluessa rekisterinpitäjä varmistaa tietojen paikkansapitävyyden. ☒ **Oikeus henkilötietojen poistamiseen**

	Tutkittavalla on oikeus vaatia henkilötietojensa poistamista kyseisestä tutki-muksesta. Tutkimusta suorittavalla taholla on kuitenkin oikeus käsitellä tutkit-tavasta ennen suostumuksen peruuttamista kerättyjä tietoja siinä tutkimuk-sessa, johon tutkittava on antanut suostumuksensa, mikäli tämä on välttämä-töntä ja tutkittava tiesi tästä ennen suostumuksen antamista (Laki lääketie-teellisestä tutkimuksesta 488/1999, 6a§). ☐ **Ei oikeutta henkilötietojen poistamiseen** Rekisterinpitäjällä on lakiin perustuva velvollisuus säilyttää henkilötietoja osana tutkimusaineistoa tietyn määräajan esimerkiksi lääkkeiden ja lääkintälaitteita koskevan kansallisen tai EU-lainsäädännön nojalla. ☒ **Oikeus käsittelyn rajoittamiseen** Tutkittavalla on oikeus henkilötietojen käsittelyn rajoittamiseen, jos kyseessä on jokin seuraavista olosuhteista: tutkittava kiistää henkilötietojen paikkansa-pitävyyden, jolloin käsittelyä rajoitetaan ajaksi, jonka kuluessa rekisterinpitäjä voi varmistaa niiden paikkansapitävyyden; käsittely on lainvastaista ja tutkit-tava vastustaa henkilötietojen poistamista ja vaatii sen sijaan niiden käytön ra-joittamista tai rekisterinpitäjä ei enää tarvitse kyseisiä henkilötietoja selosteen kohdan 6a mukaiseen tarkoitukseen, mutta tutkittava tarvitsee niitä oikeudelli-sen vaateen laatimiseksi, esittämiseksi tai puolustamiseksi. ☒ **Vastustamisoikeus** Tutkittavalla on oikeus henkilökohtaiseen erityiseen tilanteeseensa liittyvällä perusteella vastustaa henkilötietojen käsittelyä. Tällöin rekisterinpitäjä ei voi käsitellä henkilötietoja, paitsi jos se voi osoittaa, että käsittelyyn on olemassa huomattavan tärkeä ja perusteltu syy, joka syrjäyttää rekisteröidyn edut, oi-keudet ja vapaudet tai jos se on tarpeen oikeusvaateen laatimiseksi, esittä-miseksi tai puolustamiseksi. ☒ **Oikeus peruuttaa henkilötietojen käsittelyyn annettu suostumus**

	Jos kohdassa 6b on määritelty, että henkilötietojen käsittely tässä tutkimuksessa perustuu suostumukseen, tutkittavalla on oikeus peruuttaa antamansa suostumus henkilötietojen käsittelyyn. ☐ **Tutkittavan oikeuksista poikkeaminen** Tutkittavan oikeuksista (oikeudesta päästä tietoihinsa, oikaista tietonsa, oikeus käsittelyn rajoittamiseen ja vastustamisoikeus) on mahdollista poiketa tieteellisen tutkimuksen yhteydessä lain edellytysten täyttyessä (tietosuojalaki 31 §) ja mikäli on tapauskohtaisesti arvioitu poikkeuksen tarpeellisuus ja asianmukaisuus. Poikkeusmahdollisuus arvioidaan yksittäistapauksissa kunkin pyynnön yhteydessä. **Jos tutkittava haluaa käyttää henkilötietojen käsittelyyn liittyviä oikeuksiaan, hänen tulee toimittaa kirjallinen pyyntö rekisterinpitäjälle. Kirjallinen pyyntö tulee toimittaa osoitteeseen:** anna-leenamaria.karvonen@edu.savonia.fi **Rekisteröidyn pyynnöistä kieltäytyminen** Mikäli rekisterinpitäjä kieltäytyy joltain osin yllä mainittujen oikeuksien toteuttamisesta, on rekisteröidyllä oikeus saada kieltäytymisestä todistus, mistä käy ilmi kieltäytymisen perusteet. Rekisteröidyllä on oikeus saattaa kieltäytyminen valvontaviranomaisen käsiteltäväksi.
14 **Oikeus tehdä valitus valvontaviranomaiselle**	Rekisteröidyllä on oikeus tehdä valitus valvontaviranomaiselle, jos rekisteröity katsoo, että häntä koskevien henkilötietojen käsittelyssä rikotaan soveltuvaa tietosuojasääntelyä. Kansallinen valvontaviranomainen on Suomessa Tietosuojavaltuutetun toimisto, yhteystiedot: Tietosuojavaltuutetun toimisto Käyntiosoite: Lintulahdenkuja 4, 00530 Helsinki Postiosoite: PL 800, 00531 Helsinki

	Puhelin (neuvonta): 029 566 6777 Puhelin (vaihde): 029 566 6700 Faksi: 029 566 6735 Sähköposti (kirjaamo): tietosuoja@om.fi