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**PHARMACY CUSTOMERS' EXPERIENCES WITH
ELECTRONIC PRESCRIPTIONS**

A survey during the nationwide implementation

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A SURVEY DURING THE NATIONWIDE IMPLEMENTATION IN FINLAND

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ABSTRACT

The implementation of electronic prescriptions (e-prescriptions) has been incorporated into legislative reforms of pharmaceutical policy in many countries e.g. Finland introduced the nationwide e-prescription system during 2010–2017. The legislative objectives were to enhance prescribing and dispensing and to improve patient and medication safety.

This study aimed to investigate pharmacy customers' experiences with e-prescriptions and My Kanta, the web service where an individual can inspect his/her e-prescriptions, and to survey the information that customers have received about e-prescriptions and their overall satisfaction with the system. A questionnaire survey was distributed in 18 pharmacies throughout Finland in autumn 2015.

Altogether 1288 (44%) pharmacy customers responded to the survey. Pharmacy visits with e-prescriptions appeared to have succeeded well. Nonetheless, about every tenth respondent (9%) had experienced problems in purchasing prescription medicines with e-prescriptions. The difficulties usually resulted from customers' unawareness of the current status of their e-prescriptions. Problems were also rarely encountered in renewing e-prescriptions in a pharmacy (8%) or acting on behalf of someone else with e-prescriptions (6%).

Customers kept up to date with their e-prescriptions by asking at the pharmacy (49%) or checking the label affixed to the medicine package (45%). The My Kanta service was familiar to 62% of the respondents and most of them (78%) had also used the service to view their e-prescriptions. The service was assessed as clear and easy to use, and users felt that it provided a good overall picture of their prescribed medications.

Most respondents (83%) felt they had received sufficient information about e-prescriptions. Customers had usually been informed about how to purchase medicines with e-prescriptions (86%), and they were aware of the advantages of e-prescriptions for medicine users (59%) and knew how to view e-prescriptions on a computer (58%). Those who were dissatisfied with the level of information, required

more information on how e-prescriptions are protected against misuse (47%) as well as knowledge about who can view their e-prescriptions (44%). Nearly all respondents (96%) rated their overall satisfaction with e-prescriptions as between 4 up to 6 on the 6-point scale.

According to pharmacy customers, the implementation of e-prescriptions has succeeded well, and they are satisfied with the service. Viewing e-prescriptions on the My Kanta service is easy and helpful, but the service could be made better known and more commonly used by customers. Those disinclined or unable to use My Kanta need assistance from healthcare professionals in keeping up to date with their e-prescriptions. Whereas customers are mainly satisfied with information received about e-prescriptions, there are still information needs to which healthcare professionals should respond. For example, customers would like to know more about data protection and data security.

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Medical Subject Headings: Electronic Prescribing; Community Pharmacy Services; Pharmacies; Patients; Patient Satisfaction; Surveys and Questionnaires; Finland

TIIVISTELMÄ

Sähköisen reseptin käyttöönotto osana sähköistyvää terveydenhuoltoa on lääkepoliittinen tavoitetila maailmanlaajuisesti. Suomessa sähköinen resepti otettiin lainvelvoittamana käyttöön asteittain vuosien 2010–2017 aikana. Sen tavoitteina oli tehostaa lääkkeen määräämistä ja toimittamista sekä parantaa potilas- ja lääkitysturvallisuutta.

Tämän tutkimuksen tavoitteina oli selvittää, millaisia kokemuksia suomalaisilla apteekkien asiakkailla on sähköisestä reseptistä ja niiden katseluun tarkoitetusta Omakanta-palvelusta, millaista tietoa he ovat saaneet näistä uusista palveluista sekä kuinka tyytyväisiä he ovat sähköiseen reseptiin kokonaisuutena. Tutkimus toteutettiin kyselytutkimuksena 18 eri kokoisten, ympäri Suomea sijaitsevien apteekkien asiakkaille syksyllä 2015.

Kyselyyn vastasi 1288 (44 %) apteekin asiakasta. Reseptiasiointi sujui pääosin hyvin: vain joka kymmenennellä (9 %) oli ongelmia ostaessaan lääkkeitä sähköisellä reseptillä apteekissa. Yleisin ongelma oli reseptin vanheneminen tai lääkkeen loppuminen reseptiltä asiakkaan tietämättä. Ongelmat reseptien uusimisessa tai toisen puolesta asioinnissa sähköisellä reseptillä olivat myös harvinaisia (8% ja 6 %).

Asiakkaat seurasivat sähköisten reseptiensä tietoja kysymällä apteekista (49 %) tai katsomalla tiedon lääkepakkaukseen kiinnitetystä tarrasta (45 %). Omakanta-palvelu oli tuttu yli puolelle (62 %) vastanneista ja suurin osa heistä (78 %) oli joskus katsonut reseptejään palvelussa. Palvelua pidettiin helppokäyttöisenä ja selkeänä, ja se antoi käyttäjälleen ajantasaisen kokonaiskuvan määrätyistä reseptеistä.

Suurin osa (83 %) vastanneista oli mielestään saanut riittävästi tietoa sähköisestä reseptistä. Yleisimmin tietoa oli saatu siitä, miten ja mistä sähköisellä reseptillä määrätyt lääkkeet voi hakea (86 %), mitkä ovat sähköisen reseptin hyödyt asiakkaalle (59 %) sekä miten reseptitiedot voi tarkistaa tietokoneella (58 %). Asiakkaat, jotka olivat tyytymättömiä saamaansa tietoon, kaipaisivat tietoa siitä, miten sähköiset reseptit suojataan väärinkäytöksiltä (47 %) sekä ketkä voivat katsella heidän reseptitietojaan (44 %). Lähes kaikki (96 %) vastanneet arvioivat 6-portaisella asteikolla tyytyväisyytensä välille 4–6.

Apteekin asiakkaiden asiointi sähköisellä reseptillä sujuu ongelmitta ja he ovat hyvin tyytyväisiä palveluun. Reseptien katselu Omakannasta on helppoa ja hyödyllistä, mutta palvelun tunnettuutta ja käyttöä tulisi edistää. Ne, jotka eivät pysty tai halua käyttää Omakantaa, tarvitsevat terveydenhuollon ammattilaisten tukea ajantasaisten reseptitietojensa seuraamiseen. Asiakkaat ovat pääosin tyytyväisiä saamaansa tietoon sähköisestä reseptistä, mutta on vielä aiheita, joista tiedonsaanti on ollut puutteellista. Tiedontarpeet liittyvät erityisesti sähköisen reseptijärjestelmän tietosuojaan ja tietoturvaan.

Luokitus: QV 737, QV 748
Yleinen suomalainen asiasanasto: sähköiset lääkemääräykset; apteekit; asiakkaat; kokemukset; mielipiteet; tyytyväisyys; asiakastyytyväisyys; kyselytutkimus; Suomi

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years. Some of you I meet every day at the CrossFit gym, but many of you, only a few times a year. Nonetheless, I am happy to have every one of you in my life and I hope that I will always have your friendship!

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Elina Lämsä

LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following original publications:

I Lämsä E, Timonen J and Ahonen R. Pharmacy Customers' Experiences with Electronic Prescriptions: Cross-Sectional Survey on the Nationwide Implementation in Finland. Journal of Medical Internet Research 20 (2): e68, 2018. DOI: 10.2196/jmir.9367

II Lämsä E, Timonen J, Mäntyselkä P and Ahonen R. Pharmacy customers' experiences with the national online service for viewing electronic prescriptions in Finland. International Journal of Medical Informatics 97: 221–228, 2017. DOI: 10.1016/j.ijmedinf.2016.10.014

III Lämsä E, Timonen J and Ahonen R. Information received and information needed on electronic prescriptions – Finnish pharmacy customers' experiences during the nationwide implementation. Journal of Pharmaceutical Health Services Research 10: 81–89, 2019. DOI:10.1111/jphs.12275

The publications were adapted with the permission of the copyright owners. In addition, this dissertation contains previously unpublished data (presented in chapter 5.5).

CONTENTS

ABBREVIATIONS

CNS	central nervous system
EHR	electronic health record
EMR	electronic medical record
e-prescription	electronic prescription
HIT	health information technology
PHR	patient health record
WHO	World Health Organization

DEFINITIONS

E-health
E-health is the utilization of information and communication technologies (ICT) in healthcare with the aims of improving the efficiency and quality of care, and empowering patients (Eysenbach 2001).

Electronic medical record, EMR
Electronic medical record is an electronic archive containing information on encounters of a patient in a certain care setting (Heart et al. 2017). In addition to patient data, EMR can have other functions such as a clinical decision-making system, an order communication system, and a patient portal.

Electronic health record, EHR
Electronic health record differs from EMR by its accessibility (Heart et al. 2017). Whereas EMRs are institutional, EHRs share more comprehensive patient data across healthcare providers involved in the patient's care.

Electronic prescription, e-prescription
According to the Finnish Act on Electronic Prescription 61/2007, an e-prescription is a prescription issued on a data processor and stored in a centralized database (the Prescription Centre). However, the definition of an e-prescription varies between countries. The literature review of this study (chapter 2.2) provides also other definitions for e-prescriptions.

Health information technology, HIT
Use of technology in order to store, share, and analyze health data (Kruse and Beane 2018). The technology incorporates various tools e.g. websites, software, clinical decision support systems, mobile applications, and telemedical devices.

Kanta services
The Finnish national digital data system services including Prescription Centre, Pharmaceutical Database, My Kanta Pages, Patient Data Repository, Kelain (a service for issuing e-prescriptions), and Client Data Archive for Social Welfare Services (Jormainen 2018). The services enable shared access to data for citizens, pharmacies, and social and health care providers. The services are provided by Ministry of Social Affairs and Health (STM), Social Insurance Institution of Finland (Kela), National Institute for Health and Welfare (THL), National Supervisory Authority for Welfare and Health (Valvira) and Population Register Centre (VRK).

My Kanta Pages, My Kanta service

A patient portal where the user can browse his/her personal information stored in the Prescription Centre and the Patient Data Repository (Kanta 2019a). The service enables a patient to request e-prescription renewals and provide consent or refusal for disclosure of their information.

Patient Data Repository

A centralized archive of electronic patient data: a healthcare data system provided by Kanta services and used with the patient data system (Kanta 2019a). Allows also active use and storage of the data.

Patient empowerment

Patient's capacity to take action to promote his/her own health or manage a condition (Deering and Baur 2015). The situation in which the patient has rights, responsibilities, opportunities, self-determination and power in the healthcare relationship (Bravo et al. 2015). Healthcare providers respect patient autonomy and consider the patient as a partner within the healthcare relationship. Healthcare system supports patient in self-management.

Patient engagement

Process in which patients' role in their own care is strengthened and facilitated by families, carers, healthcare providers and patients themselves with the aim of enhancing safety, quality and patient-centeredness of care (World Health Organization 2016). Engaged patients are aware of their treatments, communicate actively with providers, contribute to their care, and act in health-promoting ways (Deering and Baur 2015). For example, patient engagement can be fostered by providing patients with sufficient information on their treatments and access to their health records (World Health Organization 2016).

Patient instruction sheet

A printout for the patient including a summary of an e-prescription: patient's name and date of birth, the brand or generic name of the medicine prescribed, dosage instructions, prescriber, place and date of prescribing, quantity or duration of therapy, and the expiry date of the prescription (The Act on Electronic Prescription 61/2007).

Patient portal

A web-based application providing patients with secure access to health information (Goldzweig et al. 2013). A portal can be a stand-alone system offering e.g. tools for recording wellbeing data, reliable health information or a secure messaging tool between patient and healthcare deliverer. The literature review of this study, however, focuses on portals which are tethered to an EHR giving patients access to their personal data entered by healthcare deliverers.

Personal health record, PHR

Personal health records are either self-created or electronic medical records (EMRs) of care deliverers, maintained and managed by patients themselves (Tang et al. 2006, Heart et al. 2017, Roehrs et al. 2017). Patients can monitor their health and supplement the data with information on their current and previous conditions such as medical history or home-monitored blood pressure. PHRs can be securely accessed via patient portals.

Prescription Centre

A centralized database in which e-prescriptions and their dispensing entries are stored (The Act on Electronic Prescription 61/2007).

University Pharmacy

In Finland, there are two university-owned community pharmacies: the University Pharmacy of Helsinki with 17 branches across the country and the University Pharmacy of Eastern Finland in Kuopio (Medicines Act 395/1987). University Pharmacies operate in the same way as privately-owned community pharmacies.

1 INTRODUCTION

During the past few decades, Finland has followed many other Western countries in making a quantum leap in the development of electronic services. One of the most significant advances has been achieved in healthcare with the implementation and adoption of the nationwide Kanta services during the 2010s (Jormanainen 2018). The changes required the commitment of a considerable amount of resources as well as adjustments from both healthcare professionals and patients.

One of the key themes of the Finnish e-Health and e-Social Strategy 2020 is "Citizens as service users – doing it yourself" (Ministry of Social Affairs and Health 2015). The aim is to empower citizens by providing them with access to a platform in which they can produce and maintain personal health and wellbeing data and also share it with healthcare professionals. Reliable health information and functions provided by the service help users in life management, promoting well-being, and preventing health problems. The data, shared to the extent permitted by the patient, should be utilized in planning and implementing treatments by healthcare professionals. The digitalization is expected to create benefits for the efficiency of healthcare services and for the allocation of resources during the following 5–10 years (Kallio et al. 2018).

The implementation of the Kanta services in Finland was enacted in 2007 (The Act on Electronic Prescriptions 61/2007, The Act on the Electronic Processing of Client Data in Social and Health Care Services 159/2007). The legislation aimed to improve data security and the efficiency of healthcare services, promote patients' access to information, and to enhance the prescribing and dispensing of medicines. The ultimate aim was to improve patient and medication safety.

The deployment and adoption of an e-health system can be assessed in numerical terms by estimating values such as the number of new service subscribers, log-in rates, and the number of e-prescriptions issued and dispensed (Jormanainen 2018). For example, in Finland, the nationwide implementation of e-prescriptions was conducted during 2010–2017 when the cumulative number of e-prescriptions recorded increased from 11,700 in 2010 to nearly 134 million in 2017. These indicators, however, cannot demonstrate how the national system is operating in practice or whether the legislative objectives have been achieved. It is necessary to study users' experiences, feedback and further needs in order to develop improvements in the system (Jormanainen 2018).

This study is a part of a research project exploring the implementation of e-prescriptions in Finland from the perspectives of primary care physicians, pharmacists and pharmacy customers. The study aims to investigate pharmacy customers' experiences with e-prescriptions and the My Kanta web service for viewing e-prescriptions, and the information that customers have received about the e-prescription system.

2   REVIEW OF THE LITERATURE

2.1   IMPLEMENTATION OF HEALTH INFORMATION TECHNOLOGY FROM THE PATIENTS' POINT OF VIEW

During the last few decades, there has been a major change in patients' roles in healthcare. The traditional paternalistic attitude to care has changed to empowerment and engagement of patients; they are now encouraged to be participative actors and to take charge of their own care (Wahlroos 2003, Lilja et al. 2008, Barry and Edgman-Levitan 2012, Rozenblum et al. 2015 p. 22–23, World Health Organization 2017). Instead of authoritative prescribing and technical dispensing of medicines, healthcare professionals are now expected to discuss treatment options with their patients and provide them with medication counselling. Similarly, patients often desire to discuss treatment options with their physicians and nowadays many of them would also like to discuss the choice of medicine or even participate in that decision along with the physician (Cordina et al. 2018). In some cases, if no clinical factors limit the choice, physicians may let the patient decide which medicine he/she will be prescribed (Aarnio et al. 2018).

The development of health information technology (HIT) has promoted communication and collaboration between patients and providers (Rozenblum et al. 2015 p. 24–25). Patient portals, mobile applications, telemedicine, and websites for health information and education are examples of HIT tools. Unlike the situation a mere few decades ago, today most patients in Western countries have internet access, providing them with a treasure-trove of information on health, illnesses, medications and other treatment modalities.

Patient-centered care and patient engagement have been associated with improved health outcomes, reduced service use, and greater patient satisfaction (Rozenblum et al. 2015 p. 24–25, Kruse and Beane 2018). Moreover, the use of HIT as a tool of patient engagement seems to hold promise as a way of improving health outcomes and service efficiency, as well as decreasing costs (Rozenblum et al. 2015 p. 24–25). Thus, several countries around the world have incorporated patient empowerment and the development of HIT into their recent health policy strategies (Al-Shorbaji 2013, Nøhr et al. 2018). Political commitments also encourage countries to develop their e-health infrastructures: for example, the promotion of technological applications in healthcare is a resolution issued by the World Health Organization (WHO). Furthermore, European Union member states have committed to develop their e-health services in order to facilitate cross-border healthcare (Directive 2011/24/EU of the European parliament and of the council). In the future, patient's prescriptions and other health records are expected to be electronically transferable from one member state to another. In fact, a European-wide e-prescription service has initially been deployed in Estonia and Finland; Finnish e-prescriptions have been valid in Estonian pharmacies since January 2019 (Kanta 2019b).

Patient portals, web-based applications managed by healthcare organizations, are commonly deployed HIT tools (Goldzweig et al. 2013). These enable a patient to access the organization's database, typically electronic health records (EHRs), a digital repository of his/her health data. Portals may have several other functions such as appointment scheduling, submission of prescription renewal requests, secure messaging with healthcare professionals, and general health information (e.g. Ancker et al. 2014, Nazi et al. 2015, Ronda et al. 2015). Personal health records (PHRs) are extended EHRs which are controlled by the patient: they enable the patient to enter and manage their own health data and also share it with health professionals via patient portals (Tang et al. 2006, Heart et al. 2017, Roerhs et al. 2017). Nowadays, some European countries, such as Estonia and Denmark, have implemented patient portals offering their citizens access to the nationwide EHR database (Kierkegaard 2013a, Nøhr et al. 2017).

From the patients' point of view, e-prescriptions are one of the most common HIT tools being adopted (Kierkegaard 2013b, Brennan et al. 2015). The majority of European countries have a national strategy for e-prescribing (Brennan et al. 2015). Most of them have also adopted e-prescriptions to some extent during the past ten years, with e-prescribing rates varying from 10 to nearly 100%. E-prescribing is also prevalent in United States (Gabriel and Swain 2014). The Government of Canada will invest Can $300 million over the years 2017–2022 to expand e-prescribing and the use of EHRs, and to enhance patients' access to their own records (Government of Canada 2017). Likewise, the Australian Government has made a major investment to upgrade the nationwide e-prescribing system during the years 2017–2022 (Australian Government, Department of Health 2018). The deployment of e-prescriptions aims to facilitate the workflow of healthcare professionals, but more importantly, to enhance patient safety (Parv et al. 2016, Australian Government, Department of Health 2018). The straightforward and rapid handling of prescriptions should be reflected as good quality services for patients, but patients also need to understand how to use the services and be aware of their rights.

Implementation of nationwide e-prescription system in Finland

In Finland, the implementation of e-prescriptions was a part of a wider e-health reform (Jormanainen 2018). The e-health service concept called the Kanta services is provided as a cooperation between several national authorities: Ministry of Social Affairs and Health (STM), Social Insurance Institution of Finland (Kela), National Institute for Health and Welfare (THL), National Supervisory Authority for Welfare and Health (Valvira) and Population Register Centre (VRK). In addition to e-prescriptions, Kanta services consist of a Pharmaceutical Database, a Patient Data Repository, a Client Data Archive for Social Welfare Services, a web service for issuing e-prescriptions called Kelain, and a patient portal - My Kanta Pages. Currently, all public healthcare providers and most private facilities have joined the Kanta services and are now entering medical records into a central repository, the

Patient Data Repository. With the patient's permission, all of his/her personal information is accessible to all healthcare providers throughout Finland.

Finland phased in e-prescriptions with a law issued in 2007 (The Act on Electronic Prescription 61/2007). The first e-prescription was issued and dispensed in 2010 (Jormanainen 2018). Community pharmacies were obligated to dispense e-prescriptions in 2012 (The Act on Electronic Prescription 61/2007). Public healthcare was required to adopt e-prescribing in the following year. The private sector changed over to e-prescribing in 2015 and the proportion of e-prescriptions rose to over 90% of all dispensed prescriptions (Finnish Medicines Agency and Social Insurance Institution 2017, Kanta 2019c) (Figure 1). Since 2017, all prescriptions for humans (excluding prescriptions for medicinal products without a marketing authorization and European medical prescriptions) must be in an electronic format. Paper or telephone prescriptions are only allowed under exceptional situations such as blackouts or breakdown in communications. However, even those prescriptions are converted into an electronic form in pharmacies. The legislative objectives of the reform were to enhance prescribing and the dispensing of medicines and to improve patient and medication safety (The Act on Electronic Prescription 61/2007).
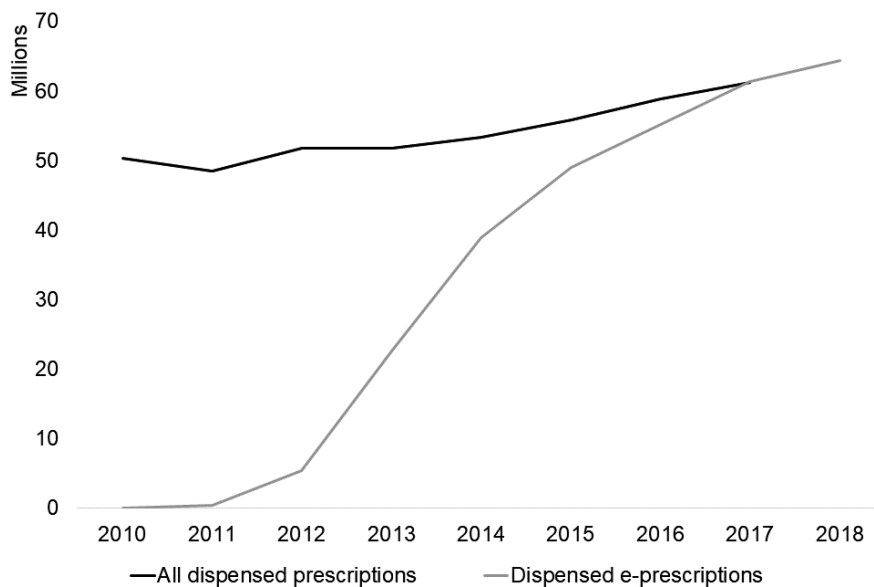
Figure 1. Trend of dispensed e-prescriptions in Finnish pharmacies during the years 2010–2018 (situation 30.4.2019) (Finnish Medicines Agency and Social Insurance Institution 2017, Kanta 2019c).

According to The Act on Electronic Prescription 61/2007, the patient must be provided with information on several issues before receiving an e-prescription for the first time (Table 1). The healthcare unit, where the patient's first e-prescription is issued, is obligated to provide information in written form, verbally, or via a secure

internet connection. Depending on the procedure of the unit, information may be given by a receptionist, a nurse, or a physician. Patients must be told about what an e-prescription is and be made aware of their rights. For example, patients have the right to obtain information on where their personal records have been accessed. Patients are also entitled to receive information about the authorities concerned, data security and data protection.

Table 1. Information that a patient is entitled to get from a healthcare unit before receiving an e-prescription for the first time (The Act on Electronic Prescription 61/2007, III).

Subject
What the e-prescription is
Patients' rights related to e-prescriptions
• Right to check their details stored in the Prescription Centre
• Right to obtain information on who has viewed and handled their personal information
• Right to require that any incorrect information about them is corrected
The national e-prescription system and related services and how they operate
The authorities arranging e-prescription services
Under which conditions a patient's e-prescription information can be accessed
Patients' right to decide on disclosure of information
How a patient's personal information is secured
Other essential details related to handling patients' personal data

A prescriber issues an e-prescription in a patient data system and signs it electronically using a smart card (The Act on Electronic Prescription 61/2007). The e-prescription is saved into the centralized database called the Prescription Centre. The patient is entitled to receive a patient instruction sheet concerning the e-prescribed medicine from the prescriber. The sheet should be printed out if the patient is present when the e-prescription is issued and if he/she does not refuse to have it. The instruction sheet includes a summary of the e-prescription: brand or generic name of the medicine, dosage instructions, prescriber, place and date of prescribing, quantity or duration of therapy, and the expiry date of the prescription.

An e-prescription stored in the Prescription Centre can be retrieved for dispensing in any Finnish pharmacy. A patient obtains his/her medicine dispensed by showing a patient instruction sheet, a personal health insurance card or some other valid ID (Kanta 2019d). By using an identifier bar code printed on a patient instruction sheet, the pharmacist can retrieve only the given e-prescription from the Prescription Centre to the pharmacy's data system. By using patient's personal identity code, the pharmacist can retrieve all of the patient's valid e-prescriptions from the Prescription Centre and then choose the one to be dispensed. Dispensing entries signed with a smart card are also recorded into the Prescription Centre. The Act on Electronic Prescription 61/2007 requires that the pharmacist must give the patient the latest information about the amount of medication still to be dispensed (The Act on

Electronic Prescription 61/2007). The information is also printed on the dispensing label to be attached to the medicine package. Patients can ask for a renewal of their e-prescriptions by contacting the healthcare unit or visiting a pharmacy, where the pharmacist will send a renewal request to the healthcare unit via the Prescription Centre.

Another person can also act on a patient's behalf at the pharmacy (Kanta 2018a). The person purchasing another individual's medicine with an e-prescription is required to present the patient's insurance card or a patient instruction sheet. A signed consent form is needed when a patient authorizes someone else to ask for a renewal of an e-prescription, request a printed summary of his/her e-prescriptions, or asks the pharmacist, physician, or nurse to delete an e-prescription.

Patients can view their e-prescription information stored in the Prescription Centre by logging into a web service called My Kanta (Kanta 2019e). The My Kanta service was introduced to citizens in 2010 when the first e-prescriptions were issued in Finnish healthcare. The service is accessible to persons with a Finnish personal ID code and means for electronic identification such as an online bank ID. My Kanta gives an overview of the user's e-prescription details: how long prescriptions are valid, whether there is any medicine still to be dispensed, logs and dispensations made by healthcare units and pharmacies. Those wishing to have a hardcopy document can print out a summary of their e-prescriptions on My Kanta. Nowadays patients can ask for a renewal of an e-prescription by themselves, as the renewal request function was added to the My Kanta service at the end of 2015. Moreover, My Kanta gives patients access to their other medical records which have been entered into the Patient Data Repository by public and private healthcare providers (Jormanainen et al. 2018). The features available in My Kanta are presented in Table 2.

Table 2. Features accessible to patients in My Kanta (Kanta 2019e).

Features of My Kanta	Description
Viewing e-prescriptions and dispensing entries • Brand name, generic name, dose, indication, and refills • Date of prescribing, prescriber's name and organization • How long the e-prescription is valid • Date(s) and place(s) of dispensing • Whether or not any medicine is outstanding	*The data is shown for 2.5 years from the date on which the prescriptions were issued*
Printing off a summary of e-prescriptions	*Users can choose whether or not to print one or more e-prescriptions* *The printout includes the medicine's name, dose, indication, and refills, date of prescribing, prescriber's name and organization, expiration date, the amount of outstanding medicine, and an identifier bar code* *The printout can be used as proof of personal medication when travelling abroad*
Submitting a request to renew an e-prescription to healthcare units[1]	
Restricting healthcare unit and pharmacy access to an e-prescription[1]	*A restricted e-prescription is only shown* • *to the prescriber of that e-prescription* • *in the case of CNS agents with abuse potential or narcotic agents, to the prescriber who is prescribing other CNS agents with abuse potential or narcotic agents to the patient* *A restricted e-prescription can be dispensed only with the patient instruction sheet or a printout summary of e-prescription (an identifier bar code included).*
Viewing which healthcare units and pharmacies have viewed or processed personal e-prescriptions	
Viewing EHRs (e.g. admissions, laboratory test results, discharge summaries)	*Records remain in the service for the statutory period of time.*
Viewing the organizations with which one's own EHRs have been shared	
Checking that data entered into My Kanta is correct	*The health service is responsible for entering patient records and correcting them*
Giving consent to healthcare units to access personal data	
Entering a living will and/or organ donation testament	
Marking information about the service as 'read'	
Acting on behalf of dependents under 10 years old[2]	*Viewing e-prescriptions and EHRs, submitting a renewal request, marking information about the service as 'read', giving consent to healthcare units to access data*
Recording and monitoring wellbeing data (e.g. blood glucose levels, daily activity, body weight)[3]	*The function is used with compatible wellbeing applications*

[1]Since November 2015
[2]Since October 2016
[3]Since October 2018, currently in trial phase

Patients have a right to control access to their personal information (The Act on Electronic Prescription 61/2007). In My Kanta, patients can see in which organizations their e-prescriptions have been viewed and handled, and with which organizations their information has been shared (Kanta 2019f). Disclosure of information from the Patient Data Repository requires the patient's consent, which is usually sought in connection with the first service event of the healthcare provider. A consent or a refusal can also be given in the My Kanta Pages. Since November 2015, patients have had an opportunity to limit healthcare units and pharmacies access to their e-prescriptions in the My Kanta Pages. In that case, a pharmacy can only dispense the patient's hidden e-prescription with a bar code printed on a patient instruction sheet or a prescription summary printed out from My Kanta (Table 2). In healthcare, however, a physician prescribing a central nervous system (CNS) medicine with abuse potential is entitled to access the patient's other prescriptions of medications with abuse potential. When restricting access to e-prescriptions in My Kanta, the patient must tick a consent box which then allows healthcare professionals to see hidden information in case of an emergency. The most important changes and practices for patients resulted from e-prescribing are presented in Table 3.

Table 3. The most important practices of e-prescribing of which patients should be aware.

New e-prescribing practices for patients
A patient instruction sheet instead of a paper prescription
All prescriptions are stored electronically in the Prescription Centre
Prescription can be retrieved for dispensing in any pharmacy
Pharmacy retrieves prescriptions with the patient's patient instruction sheet, social insurance card, or IDs
Up to date information on prescriptions can be enquired at a pharmacy or in a healthcare unit, or via the My Kanta web service
Prescriptions and other EHRs can be viewed in My Kanta
A renewal request of prescription is made electronically at a pharmacy or via My Kanta, or by contacting a healthcare unit. The renewal is arranged electronically.
Healthcare units and pharmacies to whom patient's data has been disclosed or who have handled the data are shown in My Kanta
Healthcare units' and pharmacies' access to prescriptions can be restricted in My Kanta

2.2 PATIENTS' EXPERIENCES WITH E-PRESCRIPTIONS

2.2.1 Patients' experiences with e-prescriptions worldwide

A heterogeneous group of studies has explored patients' perceptions of e-prescriptions (Table 4). Both qualitative and quantitative methods have been used, involving rather small samples of patients. In many cases, there have also been

participants who have never received an e-prescription (Porteous et al. 2003, Lapane et al. 2007, Frail et al. 2014, Cochran et al. 2015, Lee et al. 2015, Schleiden et al. 2015). Those studies have either surveyed patients' preconceptions before e-prescription implementation or compared the opinions of those who have received e-prescriptions with those who have not.

The definition of an e-prescription has varied between studies from hospital-based (Lee et al. 2015, Lau et al. 2017) to fully operational nationwide systems (Hammar et al. 2011, Parv et al. 2016) (Table 4). In the latter systems, all activities of the process are electronic: issuing, transferring, storing and dispensing of prescriptions. Most studies have been conducted in the US, where e-prescriptions are transmitted from the prescriber to the pharmacy of the patient's choice (Lapane et al. 2007, Duffy et al. 2010, Frail et al. 2014, Cochran et al. 2015). The pharmacy receives a notification of a new prescription and prepares the medicine so that it should be ready before the patient arrives to collect it. Therefore, a few American studies have investigated patients' satisfaction with waiting times at the pharmacy (Lapane et al. 2007, Duffy et al. 2010, Schleiden et al. 2015). Studies conducted in Sweden and in Estonia have explored experiences with nationwide e-prescribing systems, in which e-prescriptions are stored in a centralized database and the patient can visit the most convenient pharmacy (Hammar et al. 2011, Parv et al. 2016). In those countries, governments have also provided patients with online access to their e-prescriptions and EHRs at a national level.

In general, patients who have received e-prescriptions have been satisfied with the service (Lapane et al. 2007, Duffy et al. 2010, Hammar et al. 2011, Schleiden et al. 2015, Parv et al. 2016, Kooeinga and Singh 2017) (Table 4). In addition, patients who have no experience with e-prescriptions, believe that the service will be both convenient and safe (Porteous et al. 2003, Frail et al. 2014, Cochran et al. 2015, Lee et al. 2015, Schleiden et al. 2015). E-prescriptions are usually preferred to paper prescriptions (Lapane et al. 2007, Schleiden et al. 2015, Lau et al. 2017). According to patients, the main benefits of e-prescriptions are shorter duration and seamless nature of the service and electronic storage of documents (Cochran et al. 2015, Lee et al. 2015, Schleiden et al. 2015, Kooienga and Singh 2017). Furthermore, patients believe that e-prescribing improves medication safety by reducing prescribing and dispensing errors, and by preventing forgeries and the theft of prescriptions (Duffy et al. 2010, Frail et al. 2014, Cochran et al. 2015, Lee et al. 2015, Lau et al. 2017, Suykerbuyk et al. 2018).

Even though e-prescriptions are mainly perceived as safe (Hammar et al. 2011, Frail et al. 2014, Lau et al. 2017), a common concern raised by participants of several studies is the security of e-prescribing (Porteous et al. 2003, Cochran et al. 2015, Lee et al. 2015, Kooienga and Singh 2017, Suykerbuyk et al. 2018) (Table 4). Patients have worried about how broad the access is to their private information, how the information is protected, and whether the information could be misused. In the US, disadvantages of e-prescribing systems have been the limitations in choosing the pharmacy and prescriptions being sent to the wrong pharmacies by error of the

prescriber (Duffy et al. 2010, Frail et al. 2014, Cochran et al. 2015). Patients have also been somewhat concerned about the electronic infrastructure of the system, for example what would happen if there was a system breakdown (Cochran et al. 2015, Lee et al. 2015) and whether the costs of the system will be passed on to patients (Cochran et al. 2015). Some studies have revealed that e-prescribing may hinder patients from remembering their prescribed medications or the proper use of a new medicine (Lapane et al. 2007, Bergeron et al. 2013, Frail et al. 2014, Lee et al. 2015, Suykerbuyk et al. 2018). However, other explanations, not simply a patient's ignorance that their medicine has been precribed as an e-prescription or that the patient forgot to collect e-prescribed medicine, have been found to be reasons for unclaimed e-prescriptions (Ekedahl and Månsson 2004, Ax and Ekedahl 2010). Duplicate prescriptions and no need for the medicine have been the most common explanations for situations in which patients never used their e-prescriptions.

As e-prescribing aims to enhance prescribing and dispensing processes and so save time, it may improve the communication between the patient and healthcare professionals. Some patients, however, have felt that e-prescribing tends to worsen communication with professionals as they concentrate on doing their work at a computer (Frail et al. 2014, Lee et al. 2015). Respondents in the survey conducted by Hammar et al. (2011) had no clear opinion on whether e-prescribing had contributed to more enlightened conversations with prescribers or pharmacists. According to Schleiden et al. (2015), patients reported discussing their medications similarly with healthcare professionals irrespective of whether they received a paper prescription or an e-prescription. Likewise, aged respondents in the study of Lapane et al. (2007) reported discussing various matters with their physicians similarly regardless of whether or not they ever had received an e-prescription.

Table 4. Patients' perceptions of and experiences with e-prescriptions.

Reference, country	Definition of e-prescription	Methods, year of data collection	Key findings Benefits or positive aspects	Problems or negative aspects
Porteus et al. 2003, Scotland	Electronic transfer of prescriptions was under consideration but not implemented.	A postal survey among 494 Scottish residents (response rate 69%), 2000.	Electronic prescription transfer was regarded as a good reform which would be convenient for patients.	A significant number of patients doubted the security of the system: fears were related to unauthorized accesses and use of their personal data.
Lapane et al. 2007, US	Electronic transmission of prescriptions from prescriber to pharmacy.	A survey among 244 patients aged 65 and older visiting one of 35 primary care practices, 2006.	Patients who had received e-prescriptions preferred them to paper prescriptions.	Over half of those with e-prescription experiences agreed that paper prescriptions helped them to remember the medicine.
Duffy et al. 2010, US	Electronic transmission of prescriptions from prescriber to the pharmacy of the patient's choice.	After-hours telephone log analysis, 2007–2009. A survey of 71 patients (response rate 8%) one year after the implementation in 2009.	Patients were satisfied with the system. They felt that obtaining medicines was easier with e-prescriptions and e-prescriptions reduced medication errors.	The amount of medication-related calls increased after implementing an e-prescribing system.
Hammar et al. 2011, Sweden	Prescriber sends a prescription to the national database from which it can be retrieved and dispensed electronically by all pharmacies. Patients can access their prescriptions via the Internet.	A postal survey of 739 citizens (response rate 52%) who had their prescriptions stored in the national database, 2009.	Patients had a positive attitude towards e-prescriptions. Patients regarded e-prescriptions as safe and beneficial for them. Most patients were satisfied with the information received from prescribers or pharmacists.	
Bergeron et al. 2013, US	No definition.	Structured interviews among patients of one clinic: 144 patients before e-prescribing, 127 immediately after the implementation, and 73 one year after the implementation, 2009–2011.		Patients interviewed after the implementation of e-prescribing were less likely to be aware of indications or dosage instructions of their newly prescribed medications compared to patients interviewed before the implementation.

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Table 4. (Continued)

Reference, country	Definition of e-prescription	Methods, year of data collection	Key findings Benefits or positive aspects	Problems or negative aspects
Frail et al. 2014, US	Electronic transmission of prescriptions from prescriber to the pharmacy of the patient's choice. If system is integrated to electronic medical record (EMR), prescriber has access to patient's medication information while prescribing.	Semi-structured interviews among 12 customers of one pharmacy, 2012.	Even though patients were mainly unfamiliar with the e-prescription system, they perceived it as convenient and safe.	Negative perceptions were related to decreased communication with healthcare professionals, prescriptions being transmitted to the wrong pharmacy, and the reduction in the control of their prescriptions.
Cochran et al. 2015, US	Electronic transmission of prescriptions from a prescriber to a pharmacy.	Focus group discussions in 67 consumers, most of whom were employed in the health sector, 2013.	Participants were mainly unfamiliar with e-health services but thought that speed and paperlessness would make e-prescribing convenient. They believed it could improve safety by reducing errors, fraud, and abuse.	Concerns raised by the participants were limitations in choice of pharmacy, costs of the system being passed on to consumers, privacy and security issues, and problems with electronic infrastructure such as blackouts.
Lee et al. 2015, UK	No definition; electronic prescribing system in a hospital.	Interviews of 22 patients in a renal ward: 11 before and 11 after introducing an e-prescribing system, 2014–2015.	Patients thought that e-prescribing improved efficiency, clarity of information and reduces prescribing errors.	Communication diminished: without a paper, patients had difficulties to learn about the medication and to discuss with professionals. Patients felt that nurses and physicians focused too much on their computers. Some of the respondents were concerned about security and privacy issues.

Table 4. (Continued)

Reference, country	Definition of e-prescription	Methods, year of data collection	Key findings Benefits or positive aspects	Problems or negative aspects
Schleiden et al. 2015, US	Prescriber sends a prescription directly to a pharmacy. If system is integrated to EMR, prescriber has access to patient's medication information while prescribing.	A telephone survey of 75 patients (response rate 86%) aged 50 years or older, execution year not reported.	About half of the respondents had heard of e-prescribing in advance. The majority of them preferred e-prescriptions to paper prescriptions, because of convenience resulting from time savings, fewer visits to prescriber or pharmacy, and electronic storing of documents. Those who had received e-prescriptions were very satisfied with the prescribers and pharmacies involved in the process.	
Parv et al. 2016, Estonia	Prescriber sends a prescription to the national database from which it can be retrieved and dispensed electronically by any pharmacy. Patients can access their prescriptions via the Internet.	Descriptive secondary data analysis: data included review of both scientific and non-scientific literature, grey literature and personal correspondence, execution year not reported.	According to an annual public poll, nearly all patients were satisfied with the e-prescription service.	
Kooienga and Singh 2017, US	A prescriber sends a prescription directly to a pharmacy through a secure connection.	Interviews among 14 patients living in a remote rural community, execution year not reported.	Patients perceived e-prescriptions as convenient. They appreciated that the information was transmitted electronically so they did not need to carry papers with them.	Patients were concerned about security and the privacy of the system, and identity thefts.

Table 4. (Continued)

Reference, country	Definition of e-prescription	Methods, year of data collection	Key findings Benefits or positive aspects	Problems or negative aspects
Lau et al. 2017, Australia	An integrated prescribing and dispensing system in a multisite teaching hospital network.	A questionnaire survey among 400 patients who had received an e-prescription, 2016.	Patients held an opinion that e-prescriptions improve safety. They were unsure whether e-prescriptions had made dispensing of medicines faster, but they appreciated improved medication safety more than shortened waiting times. The majority of the respondents preferred e-prescriptions.	Only one-third of patients were aware of the use of e-prescriptions in the hospital prior to the study.
Suykerbuyk et al. 2018, Belgium	A prescription is made electronically and stored temporarily on a centralized server. It can be retrieved with a printed bar-code at a pharmacy. There are plans to make e-prescriptions paperless.	An online survey and structured face-to-face interviews in 273 Belgians, 2018	Paperless e-prescription was considered to be ecological, efficient, and to reduce the possibility of frauds and the number of visits to a doctor.	Paperlessness was considered to reduce the ability to keep up to date with one's prescriptions or prescribed medications. Participants had concerns about how to purchase prescription medicines on behalf of someone else without a paper prescription. Over a half needed further information about e-prescriptions. A notable number of participants had concerns related to the privacy of paperless e-prescriptions and difficulty in managing their overall medication.

2.2.2   Patients' experiences with e-prescriptions in Finland

In Finland, patients' perceptions of e-prescriptions were evaluated during the pilot of the current system (Hyppönen et al. 2006) (Table 5). The study population was small and limited to working age patients. In addition, three surveys have explored citizens' use of e-health services and thus also on e-prescriptions and the My Kanta web service (Hyppönen et al. 2014, Jauhiainen et al. 2014, Hyppönen et al. 2018).

Table 5. Studies exploring patients' experiences with e-prescriptions and the My Kanta service in Finland.

Reference	Methods, year of data collection	Key findings
Hyppönen et al. 2006	A postal survey among 51 participants (response rate 54%) of e-prescription pilot project, 2006.	The most important benefit for the patients was electronic storage of prescriptions. Lack of data security and data protection were considered to be the main risks associated with e-prescribing. Patients were partly dissatisfied with the information received about e-prescriptions.
Hyppönen et al. 2014	A postal survey among 4 015 citizens (response rate 27%), 2014.	The majority of the respondents were unfamiliar with or had not used My Kanta. The users perceived the service as useful. Respondents considered the possibility to view e-prescriptions and send renewal requests online to be important in the future.
Jauhiainen et al. 2014	A questionnaire survey or an online survey among 769 people living in Eastern Finland, 2013.	Most respondents had received e-prescriptions but only a few had used the My Kanta service.
Hyppönen et al. 2018	A postal survey among 4 495 citizens (response rate 45%), 2017.	Use of My Kanta service and other portals, such as viewing EHRs and sending renewal requests of e-prescriptions had increased considerably from the year 2014.

Patients involved in the e-prescription system pilot considered that e-prescriptions were safe and rendered the carrying of paper documents unnecessary (Hyppönen et al. 2006) (Table 5). The pilot patients believed that the most common risks associated with e-prescriptions were inadequate data protection and misuse of personal information. Many of the respondents wanted to exercise the right to limit healthcare professionals, especially pharmacists from having access to their e-prescriptions in the future. Patients felt they had received insufficient information about data protection and data security, the possible disadvantages for the patient, where e-prescriptions are stored, and the opportunity to view one's own e-prescriptions. Consequently, they unanimously agreed that in the future, patients should be provided with enough information about e-prescriptions both verbally and in a written form. A sizable minority of the patients had not received a patient instruction sheet concerning their e-prescription and many of them complained that they lacked any tangible reminder about their prescriptions.

During the first years when the e-prescription service was being implemented, citizens' awareness of the My Kanta service was rather poor (Table 5) (Hyppönen et al. 2014, Jauhiainen et al. 2014). Only a minority of the respondents of the population survey had used My Kanta (Hyppönen et al. 2014). However, the majority of them considered it useful. Citizens who had used a computer (My Kanta or some other service) to check their prescriptions or to request renewal of prescription estimated that use of a web service had saved them more than one healthcare visit per year (Hyppönen et al. 2014).

A few years later, a comparable population survey found that the use of My Kanta and other patient portals had increased among Finnish citizens (Hyppönen et al. 2018) (Table 5). This probably resulted from the mandated implementation of the Kanta services in both public and private healthcare. However, there were still more respondents who had received their laboratory test results or asked for an e-prescription renewal by a traditional method (phone call or visit) than by using an e-health service. Those who had used e-health services believed that they had saved more than two traditional contacts with the healthcare service annually.

2.3   PATIENTS' EXPERIENCES WITH VIEWING THEIR HEALTH RECORDS ONLINE

Patients' experiences of accessing their EHRs via patient portals have been widely studied during the last decade (Table 6). Data have been collected both by postal and web surveys but also by qualitative methods. Some of the studies have involved patients who have never used portals or have stopped using them (Van der Vaart et al. 2014, Ronda et al. 2014, Ancker et al. 2015, Nazi et al. 2015, Ronda et al. 2015). Two of the publications concentrated on older adults' general perceptions of web portals (Turner et al. 2015, Irizarry et al. 2017).

Most of the studies have been conducted in the United States, the Netherlands or Sweden (Table 6). The portals examined have mainly been hospital-based (Osborn et al. 2013, Van der Vaart et al. 2014, Forster et al. 2015) or commercial solutions sharing access only to the EHRs of the service provider. In other words, a portal may contain only information from healthcare units using a certain form of software so that if a patient should be receiving care from several providers, he/she must use different portals to browse health records or may not have access to all his/her records. This is not the case everywhere; three recent Swedish studies have explored users' experiences with a nationwide integrated portal containing EHRs from nationwide healthcare providers (Moll et al. 2018, Rexhepi et al. 2018, Wass and Vimarlund 2018). However, in Sweden, not all private healthcare providers provide patients with access to their records. Furthermore, there are differences in the content of information to which the patient is given access, depending on the region where the patient receives care.

Some of the portals are targeted to specific patient groups, e.g. diabetics or veterans (Ronda et al. 2014, Turvey et al. 2014, Forster et al. 2015, Haun et al. 2015, Nazi et al. 2015, Ronda et al. 2015) (Table 6). Nearly all of the studied portals provide patients with access to laboratory results. Furthermore, many portals offer patients access to visit notes (Woods et al. 2013, Ronda et al. 2014, Haun et al. 2015, Ronda et al. 2015, Nazi et al. 2015, Gerard et al. 2017, Moll et al. 2018, Rexhepi et al. 2018, Wass and Vimarlund 2018), an opportunity to correspond securely with their healthcare providers (Ronda et al. 2014, Ronda et al. 2015, Nazi et al. 2015), or an opportunity to enter personal data (Woods et al. 2013, Ronda et al. 2014, Ronda et al. 2015). Some portals also include health education materials (Woods et al. 2013, Ronda et al. 2014, Forster et al. 2015, Nazi et al. 2015, Ronda et al. 2015). How much information about the patient's medication is present in the portal is usually based on a manually added list or prescriptions issued in the involved units. There is a paucity of published literature concerning patients' perceptions on viewing their e-prescriptions via patient portals.

Patients who have accessed their EHRs online have regarded patient portals favorably (Woods et al. 2013, Shah et al. 2014, Van der Vaart et al. 2014, Ronda et al. 2015, Turner et al. 2015, Nazi et al. 2015, Gerard et al. 2017, Irizarry et al. 2017, Moll et al. 2018, Wass and Vimarlund 2018) (Table 6). The most common reason to use patient portals is to peruse the results of laboratory tests (Shah et al. 2014, Ronda et al. 2014, Turvey et al. 2014, Ronda et al. 2015, Irizarry et al. 2017, Rexhepi et al. 2018). Many users re-read clinical notes to ensure that they remember and understand everything they were told during the visit (Ronda et al. 2014, Gerard et al. 2017, Moll et al. 2018, Rexhepi et al. 2018, Wass and Vimarlund 2018). By using patient portals, patients also prepare themselves for future appointments (Woods et al. 2013, Shah et al. 2014, Ronda et al. 2014, Nazi et al. 2015, Gerard et al. 2017, Rexhepi et al. 2018). Users have described several benefits of portal use: it saves their personal time, money, and contacts with healthcare (Shah et al. 2014). More importantly, they have better knowledge and feel more engaged and involved in their care (Woods et al. 2013, Van der Vaart et al. 2014, Nazi et al. 2015, Gerard et al. 2017, Moll et al. 2018, Rexhepi et al. 2018, Wass and Vimarlund 2018). Those patients who have used web portals usually perceive them as clear and easy to navigate (Van der Vaart et al. 2014, Forster et al. 2015, Nazi et al. 2015, Turner et al. 2015).

In some cases, however, patient portal users have encountered problems in usability, or limitation in the content and timeliness of the EHRs included (Shah et al. 2014, Turvey et al. 2014, Turner et al. 2015) (Table 6). Problems in logging into a portal or its use, or the complexity of its content have even stopped some patients from using the portal (Turvey et al. 2014, Turner et al. 2015, Lyles et al. 2016). The most common reasons given by study participants to explain why they have used a patient portal are ignorance of the portal's existence, lack of internet access, limited technology skills, unwillingness to use technology, insufficient information received about portal, and security concerns (Goel et al. 2011, Osborn et al. 2013, Ronda et al. 2014, Turvey et al. 2014, Van der Vaart et al. 2014, Turner et al. 2015, Irizarry et al.

2017). However, some of the respondents not using patient portals have expressed their willingness to make more use of portals if they received guidance or training, or if they could allow some other individual to access the portal on their behalf (Irizarry et al. 2017). The most common suggestion for the future given by portal users is better education: users would need technical assistance to help in navigating through the portal, but also clinical support on how to interpret EHRs and how to correspond with providers appropriately (Haun et al. 2015, Sieck et al. 2017).

Despite the positive experiences and attitudes reported by patient portal users, there are publications revealing that portals are under-utilized by potential users (Van der Vaart et al. 2014, Turner et al. 2015, Smith et al. 2015). Several studies have explored factors associated with patient portal use, but the evidence is conflicting (Table 7). Many studies have found age, gender, or education to be associated with portal use: young, male and highly educated patients are likely to use portals (Ronda et al. 2013, Hyppönen et al. 2014, Ancker et al. 2015, Jhamb et al. 2015, Smith et al. 2015, Gordon and Hombrook 2016, Greenberg et al. 2017). However, not all studies found those associations to be statistically significant (Riippa et al. 2014, Turvey et al. 2014, Jhamb et al. 2015, Smith et al. 2015, Bauer et al. 2017, Greenberg et al. 2017). Many American studies have detected an association between a patient's racial background and portal use: ethnic minorities such as black people and Latinos were less likely to log into patient portals (Jhamb et al. 2015, Smith et al. 2015, Gordon and Hombrook 2016). Nevertheless, two studies conducted in the US and one in the Netherlands found no association between a patient's race and portal use (Ronda et al. 2013, Bauer et al. 2017, Greenberg et al. 2017). State of health seems to be a non-significant factor in portal use (Osborn et al. 2013, Riippa et al. 2014, Turvey et al. 2014, Greenberg et al. 2017), but results concerning the number of chronic diseases, the number of medications, and previous healthcare contacts are conflicting (Hyppönen et al. 2014, Riippa et al. 2014, Ancker et al. 2015, Smith et al. 2015, Bauer et al. 2017, Greenberg et al. 2017). A few studies have found that income, insurance status, and health literacy level were significant predictors of portal use, revealing a gap between vulnerable groups and the affluent population (Jhamb et al. 2015, Smith et al. 2015, Greenberg et al. 2017).

Table 6. Patients' experiences of patient portals[1].

Reference, country	Functions of patient portal	Methods, year of data collection	Key findings Positive aspects	Problems or development areas
Woods et al. 2013, US	Visit notes, test results, medications, problem lists, allergies, appointments, educational materials, opportunity to enter personal data and to authorize another person to use the portal.	Focus group discussions among 36 patients or their family members, 2009–2011.	Access to health records had enhanced communication with providers and improved patients' knowledge about their health. They felt being more responsible and playing more active role in their care.	Sometimes users perceived the access as stressful or harmful if records contained errors, inconsistencies, or insulting language, or if there was too detailed information of which they did not want to be aware.
Ronda et al. 2014, the Netherlands	All EHRs provided at diabetes care, a list of current medications (manually added), general information about diabetes, opportunity to upload glucose levels, and secure messaging with providers.	A postal survey among 1 390 diabetics (response rate 32%), of whom 632 had a login to the portal and 758 had not, execution year not reported.	Regular users found the access to laboratory results, the possibility to reread clinical notes, and a summary of future appointments to be the most useful functions of the portal.	
Shah et al. 2014, UK	Consultations, test results, letters sent between patient and the clinic, information leaflets.	An e-mail survey among 226 patients who had at least two logins to the portal, 2011.	Patients used the portal for viewing past activities and for preparing themselves for future appointments. Some respondents printed out records to provide a tangible reminder or proof of an event or medication. Access to EHR had saved the patients' time or money, and phone calls to the practice.	Users perceived limitations or problems in the usability of the portal, and the content and timeliness of the information.

[1]Selected studies explored experiences of patients who had used a patient portal containing their electronic health records (EHRs). Studies concerning the use of other e-health services e.g. searching health information from the Internet or secure messaging with providers were excluded.

Table 6. (Continued)[1]

Reference, country	Functions of patient portal	Methods, year of data collection	Key findings Positive aspects	Problems or development areas
Turvey et al. 2014, US	Laboratory results, self-reported health information, appointments, prescription medications.	A web survey of 18 398 veterans of whom 33% were portal users, 2012.	Users were very satisfied with the service. They were interested to view laboratory results and current medication list and also to show them to their care provider. Users found the portal useful in understanding their health history better, monitoring laboratory results and sharing their health information with others.	Those who had stopped using the portal reported that they could not find what they were looking for or that the information in the portal was not useful to them. The most common reasons for non-use were that the respondent was unaware of the portal or did not have the skills needed to use it.
Van der Vaart et al. 2014, the Netherlands	Diagnosis, case history, medication list, laboratory results, and quality of life measurements.	Postal surveys of 259 rheumatics (response rate 70%) before and 214 (59%) after implementing a patient portal, execution year not reported.	Users perceived the portal as clear, useful, complete, and easy to use. Many of them felt more involved in their care, having better knowledge about the treatment and the disease, and felt that they were receiving care of a higher quality as a result of the portal use.	Unexpectedly, the use of the portal did not affect measurements of empowerment (e.g. satisfaction with or trust in provider) or relationship with providers.
Ancker et al. 2015, US	Diagnoses, prescribed medications, visit history, allergies and laboratory results, secure messaging with providers, health educational materials.	A telephone survey of 113 portal users and 67 non-users, 2010.	Most portals users were satisfied with the service.	The majority of the respondents were concerned about privacy of electronic health data.

[1]Selected studies explored experiences of patients who had used a patient portal containing their electronic health records (EHRs). Studies concerning the use of other e-health services e.g. searching health information from the Internet or secure messaging with providers were excluded.

Table 6. (Continued)[1]

Reference, country	Functions of patient portal	Methods, year of data collection	Key findings Positive aspects	Problems or development areas
Forster et al. 2015, Australia	EHRs related to pregnancy, appointments, submission of hospital registration forms, feedback form, ability to control who can access information, and general pregnancy information.	A web-survey of 80 maternity patients (response rate 8%) using the portal, 2013.	Users would use the portal for future pregnancies. Personal records were viewed mainly after a visit to their provider. The portal was perceived as easy to register and use, and the information as readily available and accurate. Respondents stated that that the portal improved their understanding and helped them recall appointments.	
Nazi et al. 2015, US	Laboratory results and clinical notes, health education materials, prescription renewal request, secure messaging with providers; the study focused on the opportunity to view clinical notes.	A web-survey among 6 810 veterans who had used the portal and 22 157 who had not, 2013.	Portal users perceived the portal as clear and easy to navigate. They felt more empowered and believed that viewing clinical notes improved their medication adherence and helped them to prepare for visits to the clinic. Some respondents had contacted their provider after reading notes, the main reason being a willingness to learn more.	
Ronda et al. 2015, the Netherlands	All EHRs provided at diabetes care, a list of current medications (manually added), general information about diabetes, opportunity to upload glucose levels, and secure messaging with providers.	A postal survey of 632 diabetics (response rate 42%) who had requested a login to the portal, execution year not reported.	Respondents used the portal for viewing laboratory results and other records. Frequent users were more likely to assess the portal favorably as compared with respondents who had never used the service or used it only once.	In the future, respondents would like to receive information about their medications and diabetes, to request medication refills, and to have reminders about upcoming appointments via the portal.

[1]Selected studies explored experiences of patients who had used a patient portal containing their electronic health records (EHRs). Studies concerning the use of other e-health services e.g. searching health information from the Internet or secure messaging with providers were excluded.

Table 6. (Continued)[1]

Reference, country	Functions of patient portal	Methods, year of data collection	Key findings Positive aspects	Problems or development areas
Turner et al. 2015, US	Not any particular portal; participants were provided with an explanation on a website used to access health records or to communicate with providers.	Semi-structured interviews among 74 older adults, execution year not reported.	A minority of the participants were current portal users. The users were satisfied with portals and considered them easy to use. They valued easy access to their personal information, direct communication with providers, and the ability to schedule appointments.	Logging in problems and high costs of internet access were the main reasons that potential users gave for no longer using the portals.
Gerard et al. 2017, US	Visit notes and a feedback tool.	Qualitative analysis of 260 feedback reports submitted by patients or their care partners, 2014–2015.	Reading visit notes confirmed what had happened at the visit and offered a reminder about follow-up plans. Respondents valued the ability to access notes quickly and at any time. Reading notes generated positive emotions and trust in providers. Access to visit notes and the feedback tool enhanced patients' engagement and communication with providers. Respondents appreciated the care partners access to patient's notes.	
Irizarry et al. 2017, US	Not any particular portal.	Focus groups of 23 older adults; groups were assembled according to health literacy level and experience of using a patient portal, execution year not reported.	All participants perceived portals as useful, especially when viewing laboratory results. Many of them were willing to use a portal after training or would let someone else access the portal on their behalf.	Most participants reported having limited technology skills and fears about data security. Nearly all of them preferred the phone over portal messaging for communication with providers.

[1]Selected studies explored experiences of patients who had used a patient portal containing their electronic health records (EHRs). Studies concerning the use of other e-health services e.g. searching health information from the Internet or secure messaging with providers were excluded.

Table 6. (Continued)[1]

Reference, country	Functions of patient portal	Methods, year of data collection	Key findings Positive aspects	Problems or development areas
Moll et al. 2018, Sweden	National database containing laboratory results, medical notes, medication list, diagnoses, referrals, vaccinations, and access log list. The content depends on information chosen by healthcare providers as accessible	A web-survey of 2 587 patients (response rate 0.6%) who logged into the portal during the study period, 2016.	Portal users considered access to the portal as good for them. Most participants used the portal about once a month, the use was more frequent in those respondents with chronic conditions. The portal was most often used to obtain an overview of one's health, following up the previous visits, and becoming more involved in one's own care. Access to laboratory results was perceived as being the most important feature and access to log list as the least important.	
Rexhepi et al. 2018, Sweden	Laboratory results, medical notes, appointments, prescriptions, diagnoses, referrals, vaccinations, and access log list. Users can decide whether to access information such as test results which are not verified and approved by their physician.	Semi-structured interviews of 15 cancer patients who had not used the portal and 15 who had made use of it, 2013	Viewing one's own medical records helped patients understand and learn new aspects about their condition, such that they felt more in control. Immediate access to test results increased patients' well-being and reduced anxiety even if the results were worrying. With the portal, patients prepared themselves for future visits. Patients trusted in the security of the portal.	Healthcare practitioners had not informed patients about the portal, many had read about it in newspapers. When patients did not understand the content of their EHRs, they browsed the Internet to find answers.
Wass and Vimarlund 2018, Sweden	Medical notes, diagnoses, vaccinations, and access to children's EHRs.	Interviews of 9 patients and a survey among 56 patients (response rate 61%) who had used the portal, 2016	The portal was described almost exclusively in positive terms, the most common expressions being trustworthy, time-saving, a citizen's right, and easy to access. The portal helped users to understand and discuss with professionals, and allowed them to take responsibility for their own care and feel more involved.	Respondents wished that more information would be available on the service, the most useful additional information for them were test results and referrals.

[1]Selected studies explored experiences of patients who had used a patient portal containing their electronic health records (EHRs). Studies concerning the use of other e-health services e.g. searching health information from the Internet or secure messaging with providers were excluded.

Table 7. Studies exploring factors related to patient portal use[1].

Reference, country	Methods, year of data collection	Factors associated with portal use Significant factors	Non-significant factors
Ronda et al. 2013, the Netherlands	A postal survey of 1 390 diabetics (response rate 32%) of whom 632 had a login to the portal and 758 had not, 2011–2012	Age, sex, education, living status, work status, treatment setting, duration of diabetes, polypharmacy[2]	Race
Hyppönen et al. 2014, Finland	A postal survey of 4 015 citizens (response rate 27%), 2014	Number of healthcare contacts, education, area of residency, number of prescription medicine purchases	Population density of the area
Riippa et al. 2014, Finland	A survey and a register study of 222 patients who were provided with an access to the portal, 2011–2012	Number of nurse visits, number of measurements of physiological outcomes	Age, sex, state of health, previous service use
Turvey et al. 2014, US	A web survey of 18 398 veterans of whom 33% were portal users, 2012	Gender, self-rated computer ability, possessing some kind of system for organizing health information, asthma or lung disease	Age, self-rated health, pain, diabetes, orthopedic problems, mental disease, the patient valued having a personal record of his/her health
Ancker et al. 2015, US	A telephone survey of 113 portal users and 67 non-users, 2010	Education, frequent Internet use, number of prescription medicines	Patient activation level
Jhamb et al. 2015, US	A register study of 2 803 nephrology patients, 2010–2012	Age, marital status, race, education, insurance status, neighborhood's income level	Sex
Smith et al. 2015, US	Structured interviews of 534 older adults, 2008–2011; data of their patient portal usage, 2006–2014	Race, education, health literacy level	Age, gender, number of chronic conditions

[1]Only studies exploring portals containing electronic health records (EHRs) and using a multivariable model as an analysis method were included.
[2]Multivariable analyses was conducted only for type 2 diabetics' data (517 patients who had a login, 745 who had not).

Table 7. (Continued)[1]

Reference, country	Methods, year of data collection	Factors associated with portal use Significant factors	Non-significant factors
Gordon and Hombrook 2016, US	A register study of 231 080 seniors with different ethnic backgrounds, 2013	Age, race	
Bauer et al. 2017, US	A survey of 918 adult patients (response rate 67%), 2013	Existence of any chronic medical condition	Age, gender, race, health literacy level, current depressive symptoms
Greenberg et al. 2017, US	A postal survey of 3 497 adult citizens, 2014	Number of chronic conditions, age, income, regular provider	Sex, race, education, insurance status, self-reported ability to take care of own health, self-reported general health, confidence that EHRs would be safe

[1]Only studies exploring portals containing electronic health records (EHRs) and using a multivariable model as an analysis method were included.

3 AIMS OF THE STUDY

The overall objective of this study was to investigate pharmacy customers' experiences with the recently implemented nationwide e-prescription system in Finland.

The specific aims were:

1. to study the experiences that pharmacy customers have with visiting a pharmacy with e-prescriptions (I).
2. to explore how well the My Kanta web service is known and how commonly it is used by pharmacy customers, and how they perceive the usability of the service (II).
3. to investigate the information that pharmacy customers have received about e-prescriptions (III).
4. to measure how satisfied pharmacy customers are with e-prescriptions as a whole (I).

4 MATERIALS AND METHODS

4.1 THE SURVEY

Pharmacy customers' experiences were investigated by the means of a questionnaire survey distributed from community pharmacies across Finland. A survey is a useful method for gathering information cost-effectively from a large population (Turunen 2008). The information collected may be generalized to the entire population of interest.

The survey was targeted at pharmacy customers aged ≥18 years who were purchasing medicines for themselves with e-prescriptions. The study involved 18 different-sized pharmacies from all six Regional State Administrative Agencies' areas: Southern Finland, Southwestern Finland, Western and Central Finland, Eastern Finland, Northern Finland, and Lapland (Aluehallintovirasto 2019). The Åland Islands, an autonomous region of Finland, were excluded from the study since e-prescribing had not yet been implemented there. One University Pharmacy branch, one large city pharmacy, and one small rural pharmacy were recruited from each area using convenience sampling.

In September 2015, altogether 2950 questionnaires were mailed to pharmacies engaged in the study. The number of questionnaires delivered to each pharmacy varied from 30 up to 200 and was adjusted according to the number of prescriptions dispensed daily in the pharmacy. Pharmacists were provided with instructions on the distribution of questionnaires. They informed customers eligible for the study after dispensing their medication and offered them the questionnaire together with a cover letter and a franked envelope for the return of their responses. The documents were only available in Finnish. Pharmacists were not required to keep a list of customers who declined to participate. The questionnaires were handed out as long as there were forms left, but for a maximum of two weeks. After the study period, pharmacies reported the number of questionnaires left to compute the response rate. Altogether, 2915 questionnaires were distributed. Reminders could not be sent as the researchers were unaware of the customers' addresses.

4.2 THE QUESTIONNAIRE

The design of the questionnaire (Appendix 1) was based on the objectives of e-prescriptions as set by law (The Act on Electronic Prescription 61/2007), the anticipated impacts of e-prescriptions submitted by the government (the Government proposal for the Act on Electronic Prescriptions 250/2006), and some previous studies (Hyppönen et al. 2006, Hammar et al. 2011, Heikkilä 2013).

The 4-page form contained both structured and open-ended questions, in all, a total of 26 questions. The questions concerned five main themes: (1) customer's

experiences with using e-prescriptions, (2) experiences with the My Kanta service, (3) information received and information needed on e-prescriptions, (4) security of e-prescriptions (results reported by Rattay et al. 2018) and (5) opinions on the benefits and problems with e-prescriptions (results reported by Sääskilahti et al. 2016). Furthermore, the last questions in the form inquired about the respondent's background information and there was space for free comments about e-prescriptions, My Kanta or the questionnaire. The questionnaire was initially tested for content validity by a few social pharmacy researchers with experience of the design of questionnaire surveys. The instructions for pharmacies, the data collection procedure and the comprehensibility of the questionnaire were piloted in a local pharmacy in May 2015. The researcher interviewed the pilot respondents in the pharmacy after filling in the questionnaires to check that they had understood the questions. Some modifications were made based on the pilot test, the most notable being changes to the questions concerning benefits and problems; these were converted from multiple-choice questions into open-ended questions. Moreover, some structured questions were rephrased after the initial pilot survey.

Respondents' experiences with the patient instruction sheet, purchasing medicines with e-prescriptions, renewal of e-prescriptions, acting on behalf of some other person, and keeping up to date with e-prescriptions were explored by means of structured questions (Questions 2 to 10 in Appendix 1). Some of the response alternatives had space to allow the respondent to provide further clarification. Two questions concerning the respondent's experience with visiting a pharmacy for medicine purchases were defined with the phrase "this time at the pharmacy", the aim being to gain cross-sectional data about technical problems or ambiguities in e-prescriptions and whether pharmacists had informed customers about the current status of their e-prescriptions as they are legally required (The Act on Electronic Prescription 61/2007) (Questions 2 and 6 in Appendix 1). Furthermore, the question exploring possible problems and ambiguities occurring during the dispensing had structured response options and an option to allow freely worded answer (Question 2 in Appendix 1). Problems occurring in the renewal process or acting on behalf of some other individuals were reported in the respondent's own words. The respondent's overall satisfaction with e-prescriptions was measured using a six-point Likert-type rating scale, where 1 represented not at all satisfied and 6 as very satisfied (Hammar et al. 2011) (Question 21 in Appendix 1).

Respondents' familiarity and experiences with My Kanta were investigated using three structured questions (Questions 17 to 19 in Appendix 1). Respondents' opinions about the usability of the My Kanta service were measured using an eight-item list of positive statements concerning the features of the My Kanta Pages (Question 20 in Appendix 1). The respondents gave their answers using a five-item Likert-scale indicating their degree of agreement: 1 = I fully agree, 2 = I agree to some extent, 3 = I disagree to some extent, 4 = I fully disagree, and 5 = I do not know.

Information sources and information that had been learned were obtained by means of multiple response questions with the opportunity to choose several

alternatives (Questions 11 and 12 in the Appendix 1). The respondent's opinion on the sufficiency of the received information was obtained by a structured question with options Yes and No (Question 13 in Appendix 1). A 'No' was followed by the open-ended question "What further information would you like?"

Structured questions yielded background information on the respondent's gender, education and area of residence (Questions 22 and 24–25 in Appendix 1). The respondent's current use of prescription medicines was obtained by means of a structured question with the following options; regular basis (e.g. high blood pressure medication), temporary basis (e.g. antibiotics, painkiller), and both regular and temporary basis (Question 26 in Appendix 1). The respondent's year of birth was obtained by means of an open-ended question (Question 23 in Appendix 1). Furthermore, a structured question on the respondent's medicine purchases with e-prescriptions within the previous six months was used as a background variable (Question 1 in Appendix 1).

4.3 STATISTICAL ANALYSES

Data from the questionnaires were stored and analyzed by using the Statistical Package for Social Scientists software (IBM SPSS Statistics for Windows, Versions 21.0, 23.0 and 25.0 Armonk, NY: IBM Corp.). In the analyses, the respondent's age was categorized into one of four groups (19–34, 35–59, 60–74, and 75 years and older). The Likert scale items were combined to form the classes: "Agree to some extent/Fully Agree" and "Disagree to some extent/Fully disagree", because numbers of some responses were so small that comparing with background variables was impossible. In addition, the question concerning e-prescription information sources (Question 11 in Appendix 1) the alternative "a receptionist" was combined with "a nurse" since nurses can also work at a healthcare unit's reception and it may be difficult to be aware of the education of the person giving the information.

A descriptive approach (frequencies, percentages, means) was used in the analysis. Categorical data was compared with background variables using either the Pearson chi-square test or two-sided Fisher exact test. The continuous variable of the respondent's satisfaction with e-prescriptions was tested for normality by using the Kolmogorov-Smirnov test. The statistical significance between means in independent groups was assessed using the Mann-Whitney U or Kruskal-Wallis tests. Statistical significance was determined as $p<0.05$.

In the free-text answers to the question concerning the respondent's information needs (Question 13 in Appendix 1) most respondents referred to the response alternatives of the previous question concerning information learned about e-prescriptions (Question 12 in Appendix 1), for example "About all of those alternatives that I did not circle in Question 12". These answers were categorized deductively into those themes mentioned. Answers not referring directly to the previous question were classified into new categories. However, the categories

created other than "Renewal" were combined as "Other" since they included only a small number of cases.

In order to further analyze which factors were related to familiarity with the My Kanta web service (versus being not familiar with the service) a logistic regression analysis was conducted with gender, age group, education, use of prescription medicines, and whether or not the respondent had received sufficient information about e-prescriptions. The results are presented as odds ratios (ORs) together with their 95% confidence intervals (CIs).

4.4 ETHICAL CONSIDERATIONS

The study setting and research process complied with both local and national ethical instructions for research (Finnish Advisory Board on Research Integrity 2019, University of Eastern Finland, Committee of research ethics 2019). This study required no ethical approval. Pharmacy owners agreed to conduct the study in their pharmacies.

5 RESULTS

5.1 STUDY POPULATION

The study flow is presented in Figure 2. In total, 1290 questionnaires were returned to the School of Pharmacy, University of Eastern Finland. Two forms, however, were excluded as the respondents were aged less than 18 years. Therefore, the final study sample was 2913, giving a response rate of 44.2%.

The majority of the respondents were female (Table 8). The respondents' ages ranged from 19 to 93 years; the mean age was 59 years and the median age 62 years. Respondents represented all six geographical areas of Finland. The majority of the respondents used prescription medicines regularly and had purchased medicines with e-prescriptions several times prior to participating in the study.

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│ research pharmacies across Finland│
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│ 2915 questionnaires distributed │
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│          respondents            │
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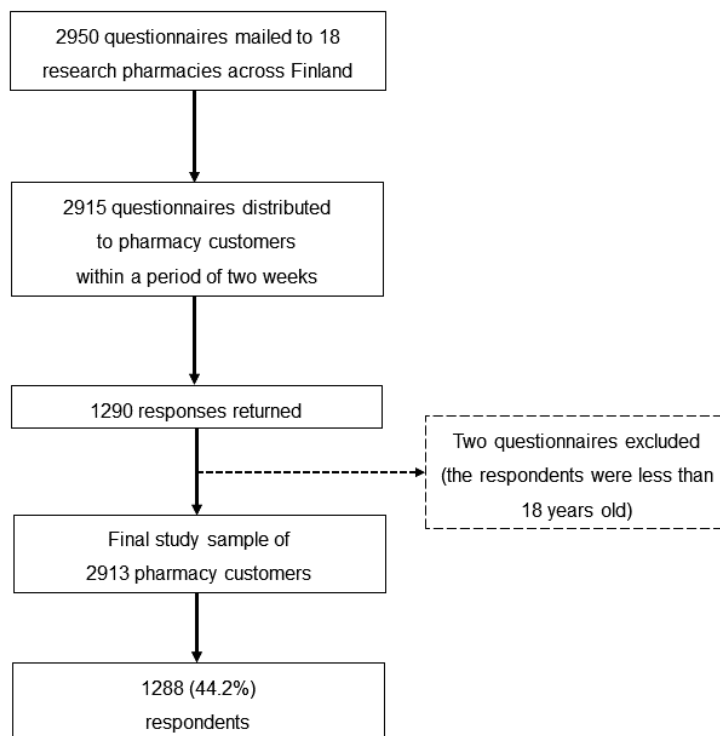
Figure 2. Flow chart of the questionnaire survey process.

Table 8. Characteristics of the study respondents (N=1288).

Characteristic	n	(%)
Gender	n=1287[1]	
Female	965	(75.0)
Male	322	(25.0)
Age, years	n=1167[1]	
19–34	137	(11.7)
35–59	379	(32.5)
60–74	476	(40.8)
≥75	175	(15.0)
Education	n=1263[1]	
Basic education (comprehensive school)	274	(21.7)
Vocational qualification	459	(36.3)
Secondary school graduate	152	(12.0)
Lower-level university degree	203	(16.1)
Higher-level university degree	175	(13.9)
Area of residence	n=1283[1]	
Southern Finland	301	(23.6)
Southwestern Finland	208	(16.3)
Western and Central Finland	205	(16.1)
Eastern Finland	183	(14.3)
Northern Finland	256	(20.1)
Lapland	123	(9.6)
Current use of prescription medicines	n=1272[1]	
Temporarily	117	(9.2)
Regularly	715	(56.2)
Both regularly and temporarily	440	(34.6)
Medicine purchases with an e-prescription within the last six months	n=1283[1]	
First time during the study	37	(2.9)
2–5 times	688	(53.6)
6–10 times	335	(26.1)
Over 10 times	223	(17.4)

[1]Some of the respondents did not report their gender, age, education, current medicine use, area of residence, or times they had purchased medicines with e-prescriptions within the last six months.

5.2 EXPERIENCES WITH E-PRESCRIPTIONS (I)

Most study respondents (59.9%) had usually received a patient instruction sheet concerning the e-prescribed medicine from their physicians (I). A sizable minority (40.1%), however, reported not receiving this sheet. In most cases, the physician had not offered it (23.8%), but a considerable proportion of the respondents were unaware of what was meant by a patient instruction sheet (10.8%).

Most of the respondents' visits to pharmacies with e-prescriptions succeeded without any problems (I) (Table 9). Approximately every tenth respondent had experienced some inconvenience during the pharmacy visit on which he/she received the questionnaire. Problems encountered during the pharmacy visit were mostly related to the respondent's unawareness of the current status of the e-prescription i.e. the prescription had expired or had no refills remaining. Problems were encountered more often among respondents aged 75 or older and respondents using prescription medicines both regularly and temporarily (p=0.005 and p=0.04, respectively) as compared with others.

Table 9. Problems that study respondents had experienced with e-prescriptions. A respondent may have reported several issues.

Problem	n	(%)
Inconvenience or problem during the pharmacy visit[1] (n=1278[2])	**117**	**(9.2)**
E-prescription had expired	59	(50.4)
E-prescription had no medication remaining	40	(34.2)
Physician had not sent the e-prescription as promised	22	(18.8)
E-prescription contained a flaw, so the pharmacist had to contact the physician	15	(12.8)
Breakdown of communication with the Prescription Centre	7	(6.0)
Something else	19	(16.2)
Inconvenience or problem in renewing e-prescriptions through the pharmacy (n=628[2])	**49**	**(7.8)**
E-prescription was not renewed (e.g. technical problems) or there was a delay	19	(38.8)
Private healthcare does not accept electronic renewal requests	9	(18.4)
No notification about an authorized renewal	6	(12.2)
Renewed e-prescription contained a flaw	5	(10.2)
Something else	9	(18.4)
Inconvenience or problem in taking care of an e-prescription for another person (n=418[2])	**25**	**(6.0)**
Unawareness that a signed consent was needed	11	(44.0)
A parent's inability to access a minor's e-prescriptions in My Kanta	4	(16.0)
Something else	8	(32.0)

[1]The question concerned the visit when the respondent received the questionnaire
[2]Number of respondents who responded to that question

According to our results, every fifth respondent (20.6%) stated that pharmacists did not comply with the instruction to inform customers after the dispensing: the respondents were not provided with information about the status of their e-prescription. Approximately half of the respondents (49.4%) reported keeping up to date with their e-prescriptions by asking at the pharmacy (I: Table 3). Nearly as many (44.9%) read the label affixed to the medication package. The oldest and the youngest respondents asked about their e-prescriptions' status at the pharmacy more often than others (p=0.01). Reading the label was more common among those aged 60 years or older compared with younger respondents (p<0.001). Respondents younger than 75 years and those having higher education than simply basic school were more likely to check the current status of their prescriptions from My Kanta service than the oldest respondents and those with the lowest education level (p<0.001 for both).

Slightly over half of the respondents (50.4%) had renewed their e-prescriptions through the pharmacy. Men (p=0.03), the oldest respondents (p<0.001), those with only basic education (p<0.001), those using prescription medicines regularly or both regularly and temporarily (p<0.001) and respondents living in Lapland or Eastern Finland (p<0.001) had more often experiences with pharmacy renewal than others (I: Table 2). Less than one out of ten reported they had encountered problems in renewing e-prescriptions through the pharmacy or acting on behalf of another person (I) (Table 9). In e-prescription renewals, respondents perceived long waiting times during the process as inconvenient. In some cases, renewal requests were not transferred to the healthcare unit or the request had expired before renewing. Only a few problems were encountered while acting on behalf of someone else (Table 9). Almost half of them were related to the respondent's unawareness that a signed proxy was required.

5.3 EXPERIENCES WITH THE MY KANTA SERVICE (I–III)

Most pharmacy customers (62.1%) were familiar with the My Kanta web service (II: Table 3). Of those familiar with the service, 77.5% (45.7% of all respondents) had logged in and viewed their e-prescriptions at least once. Nevertheless, the service was not very regularly used: only 38.4% (n=491) of all respondents reported keeping up to date with their e-prescriptions by using the My Kanta service (I: Table 3).

A sizable minority (37.9%) did not know anything at all about My Kanta (II). Customers using prescription medicines only temporarily were less likely to report being familiar with My Kanta as compared to regular medicine users (p=0.006) (II). Customers aged 75 years or older and those having only basic education were less likely to be familiar with the service (p<0.001 for both) or use it for keeping up to date about their prescriptions (p<0.001 for both) compared to younger and more educated customers (I, II). According to the multivariate analysis, men were more likely than women to use My Kanta for viewing their e-prescriptions (OR 1.70, CI 95% 1.02–2.82)

(II). In addition, age of 75 years or more reduced the likelihood of having used the service (OR 0.40, CI 95% 0.18–0.86).

Pharmacy customers who had used the My Kanta service were very satisfied with it: from 81.4% up to 96.8% of them agreed with seven out of eight positive statements concerning the usability of the service (II) (Figure 3). According to them, My Kanta provides a good overall picture of their prescribed medications and with the service it is easy to check the current status of e-prescriptions, such as the expiration date or the amount of medication remaining.
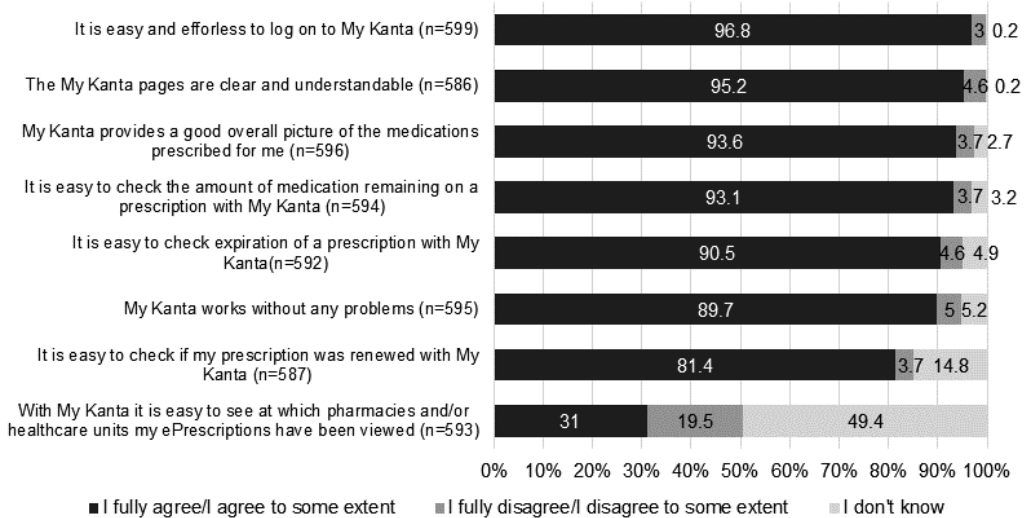
Figure 3. Respondents' opinions on statements concerning the My Kanta web service (opinions were only given by respondents who had used the service).

5.4   INFORMATION RECEIVED ABOUT E-PRESCRIPTIONS (III)

From the ten mandated pieces of information (chapter 2.1), most of the surveyed pharmacy customers were aware of three items (III) (Table 10). However, the majority of the respondents (83.3%) felt that the information they had received about e-prescriptions had been sufficient.

Customers had learned about different topics depending on their age, education, regularity of prescription medicine use, and number of recent medicine purchases with e-prescriptions (III: Table 4). For example, the oldest respondents were less likely to be aware about My Kanta (p<0.001) or where e-prescriptions are stored (p=0.013) compared with younger respondents. Respondents with the lowest education were also less likely to have knowledge of these topics (p<0.001 and p=0.001, respectively). Interestingly, the oldest respondents and respondents with only basic education were less likely to be informed about several topics but tended

to be the most satisfied with the information received about e-prescriptions (p=0.003 and p=0.001, respectively) (III: Table 4 and Table 5). Furthermore, customers using prescription medicines regularly were more likely to be satisfied with the information compared to customers having only temporary prescription medicines (p=0.039).

Table 10. Information the respondents (N=1176) had received on e-prescriptions.

Subject	n	(%)
How to purchase medicines with e-prescriptions	1000	(85.5)
What are the benefits of e-prescriptions for customers	691	(58.8)
How to view e-prescriptions on a computer	680	(57.8)
Where are e-prescriptions stored	466	(39.6)
How another person can act on behalf of a patient at pharmacy	386	(32.8)
Who can view a patient's e-prescriptions	334	(28.4)
For what purposes patient's e-prescription information can be used	208	(17.7)
Patient's right to limit the viewing of the e-prescription information	180	(15.3)
How are e-prescriptions protected against misuse	174	(14.8)
Which authorities arrange services related to e-prescriptions	110	(9.4)

Respondents dissatisfied with the information (n=207) needed more information about data protection and data security: the protection against misuse (46.9%) and who can view one's e-prescription information (44.1%) (III: Table 6). Ignorance of these issues were also observed in a question concerning the usability of the My Kanta service. Half of the service users (49.4%) did not have any opinion on whether it would be easy to see with My Kanta at which healthcare facilities their e-prescriptions have been viewed, illustrating that they may not know about the existence of the feature (II) (Figure 3).

5.5 SATISFACTION WITH THE E-PRESCRIPTION SERVICES (I, UNPUBLISHED RESULTS)

The study respondents were highly satisfied with e-prescriptions (I). Nearly all (95.9%) rated their overall satisfaction as from four to six on a 6-point scale (Figure 4). Respondents' overall satisfaction with e-prescriptions differed similarly between groups as the satisfaction with information received (chapter 5.4, III): respondents aged 60 years or more, those with low education, and those using prescription medicines regularly were more likely to be very satisfied with e-prescriptions as compared to younger customers, those with a university qualification, and those using medicines only temporarily (p=0.049, p<0.001 and p=0.03, respectively) (I: Table 4).
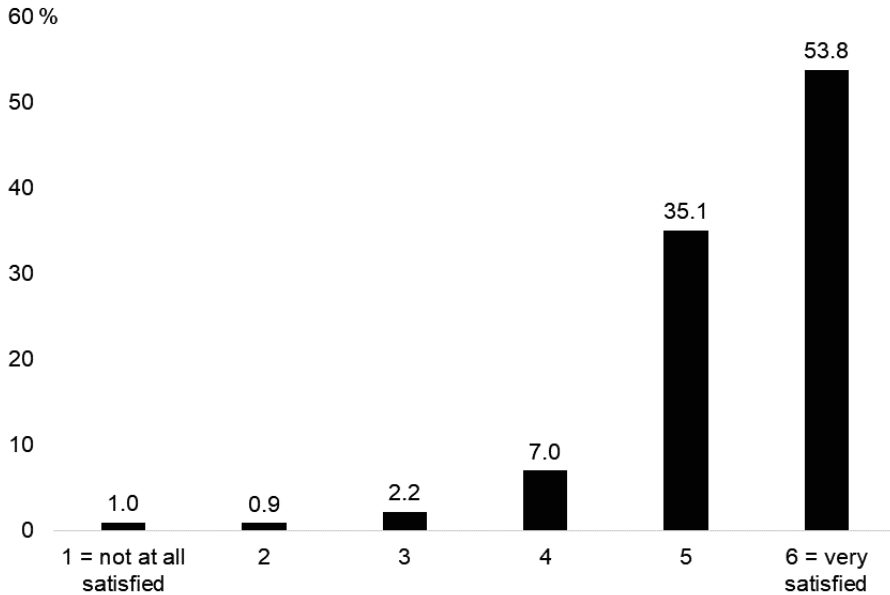
Figure 4. Respondents' (N=1274) overall satisfaction with e-prescriptions.

Overall, the respondents who were satisfied with the information received, were also more likely to be very satisfied with e-prescriptions compared with respondents dissatisfied with the information (p<0.001). Furthermore, respondents who encountered no problems with their e-prescriptions at the pharmacy were more likely to rate their overall satisfaction with e-prescriptions as higher than those having problems or inconveniences during the study visit (p<0.001).

Respondents familiar with the My Kanta service were more likely to be very satisfied with e-prescriptions as compared to respondents who did not know about the service (p<0.001). However, there were no significant differences between the satisfaction of service users and non-users (p=0.328).

6 DISCUSSION

6.1 STUDY RESULTS

6.1.1 Pharmacy customers' experiences with e-prescriptions and information received about them

Pharmacy customers who participated in this study were very satisfied with the recently implemented Finnish nationwide e-prescribing system. They had rarely encountered any problems when patronizing a pharmacy with e-prescriptions. A few findings emerging from this study, however, revealed that the information customers had received about e-prescriptions services had been insufficient and some customers had difficulties in keeping up to date with their prescriptions.

The study respondents revealed high overall satisfaction with e-prescriptions, which is in accordance with the results of previous studies conducted among medicine users in US, Sweden, and Estonia (Lapane et al. 2007, Duffy et al. 2010, Hammar et al. 2011, Schleiden et al. 2015, Parv et al. 2016, Kooienga and Singh 2017). Whereas Finnish pharmacists and primary care physicians have rather often reported experiencing technical problems, system rigidity and ambiguities in e-prescriptions (Kauppinen et al. 2017abc), the pharmacy customers investigated here only rarely reported encountering problems. The difficulties occurring in correcting prescriptions and dispensing entries as well as defects in e-prescriptions (Kauppinen et al. 2017abc) may well be unobserved by customers. When comparing Finnish healthcare professionals' satisfaction rates with pharmacy customers (Kauppinen et al. 2017b, Kauppinen 2018), it is evident that customers are more satisfied with e-prescriptions.

The majority of studied pharmacy customers were also satisfied with the information they had received about their e-prescriptions. In contrast, most participants of a Belgian survey stated that they would need further information about their national e-prescription system (Suykerbuyk et al. 2018). The literature recognizes that patients, in general, tend to be very satisfied with healthcare services (Lilja et al. 2008 s. 309). The level of satisfaction is usually affected by their prior expectations. Lay people may not have any particular assumption about the quality of a healthcare service or the level of information they will receive. Thus, they rate their satisfaction as high as their low expectations are fulfilled. In this study, young and highly educated customers were likely to be dissatisfied with the level of information received, indicating that they might have had higher expectations. When considered from a legal point of view, pharmacy customers have received insufficient information about e-prescriptions: it was anticipated that they should have an awareness of about ten mandated subjects when receiving their first e-prescriptions (the Act on Electronic Prescription 61/2007), but only three were

recognized by most respondents. The oldest pharmacy customers had less frequently learned about the My Kanta service, where their e-prescriptions are stored, and how they can limit viewing of their e-prescriptions, compared with younger customers. A similar trend was observed among customers with a low level of education. Healthcare providers providing information may have assumed that older customers would not understand or be interested in the web service or how the system is built. Nevertheless, the information provided should be the same for everyone as it is decreed as such in the law.

As the content of received e-prescription information was self-reported and the recall period may have been a few years for some respondents, some recall bias is possible (Tolonen 2006). Patients have been reported to recall from as little as 11% up to 86% of the medical information they had received or on discussions they had had during a healthcare visit (McGuire 1996, Tarn and Flocke 2011, Richard et al. 2017). The lowest recall rates were observed in a study where participants simply viewed a videotape (McGuire 1996) with the higher rates being achieved when study patients received information in a discussion with their physician (Tarn and Flocke 2011, Richard et al. 2017). Neither the patient's age nor his/her education level seem to have any effect on the recall rate. The amount of information remembered is at its highest immediately after the visit and declines with time (McGuire 1996). In addition, if there is a dialogue, or the patient takes the initiative and there is more discussion, then these are all factors that increase the level of information recall (Richard et al. 2017). Thus, patients should receive information on the e-prescription system repeatedly and it should be at a level they can understand, with the possibility that they can ask questions, and discuss the answers with the healthcare professional.

There are some findings emerging from this study indicating that some pharmacy customers would have needed further information or assistance with e-prescriptions. First, every tenth respondent had never received a patient instruction sheet and was unaware of its existence. Second, almost 40% of the studied pharmacy customers were unfamiliar with the My Kanta service. Third, the most prevalent problems customers encountered during pharmacy visits were related to their lack of awareness of the current status of their e-prescriptions. If a patient has no tangible or electronic documents of his/her prescribed medicines, problems might appear in managing his/her overall medication. The most common disadvantage that Finnish pharmacy customers have reported in e-prescriptions is the difficulty in keeping up to date with the details of their e-prescriptions (Sääskilahti et al. 2016). This problem has also been noticed by Finnish pharmacists (Timonen et al. 2016). The difficulty seems to occur among older pharmacy customers and those without Internet access or electronic IDs to allow a My Kanta log-in (Sääskilahti et al. 2016, Timonen et al. 2016, Rattay et al. 2018). Furthermore, not all respondents were provided with information about the current status of their e-prescriptions by pharmacists during the study visit, even though it is an obligation included in the Act on Electronic Prescription (The Act on Electronic Prescription 61/2007). To support customers in keeping up to date about their e-prescriptions, this information should be provided

verbally at every pharmacy visit. Customers should also be reminded that the information is printed onto the dispensing label of the medicine package and can also be checked on My Kanta.

Pharmacy customers' e-prescription information needs were mainly related to data security and data protection. The finding is similar to that of the Finnish e-prescribing pilot study (Hyppönen et al. 2006). A recent study revealed that every fourth Finnish pharmacy customer expressed fears about unauthorized access to their e-prescriptions (Rattay et al. 2018). Another study found that Finnish citizens regarded data security and improved medication safety as important goals for the e-health services in future (Hyppönen et al. 2014). E-prescription related privacy and security concerns have also been raised by medicine users in the US (Cochran et al. 2015, Kooienga and Singh 2017) and UK (Porteous et al. 2003, Lee et al. 2015). E-health systems are stringently secured (Kanta 2019g), so that fears and concerns are probably due to insufficient information being provided to patients.

A major strength of the Finnish nationwide e-prescription system is that its implementation was made legally compulsory to be adopted by all healthcare providers and pharmacies. The adoption was carefully planned, coordinated and executed in an effective collaboration between the national authorities, organizations and healthcare providers (Jormanainen 2019). Another important legal provision was that patients should be adequately informed about the system; however, this aspect does not seem to have fully succeeded in the first years of the implementation. According to this study, pharmacies played a significant role in providing e-prescription information although this is not an actual obligation as defined by the Act on Electronic Prescription (61/2007). Therefore, pharmacists have lacked consistent instructions on how best to inform their customers. The implementation of e-prescriptions has also changed prescribing and dispensing practices, and healthcare professionals have also been forced to adopt new technologies in a rather tight schedule (Kauppinen et al. 2017abc). Thus, patient education may have been challenging for them in the early stages of this process. To understand and learn about new reforms of healthcare, lay people evidently need the information to be repeated several times. Those using prescription medicines regularly visit pharmacies; in general, at least four times annually although healthcare contacts are probably less frequent. Hence, extending the information obligation from healthcare units to pharmacies would better ensure that medicine users actually obtain sufficient information about their e-prescriptions. Providing the information in a stepwise manner would be sensible as customers gain experience with e-prescriptions and are better prepared to understand more advanced subjects. In addition, there will always be new medicine users i.e. people who have recently received their first e-prescriptions and need information about the system. The providers of the Kanta services are responsible for disseminating information about its services to the public. However, as the authorities cannot reach patients in a very comprehensive way, e-prescription related information should be provided actively and continuously at healthcare units and pharmacies.

Ease of purchasing e-prescription medicines and electronic storage of prescriptions have been reported to be beneficial changes for patients (Sääskilahti et al. 2016). E-prescriptions enable patients to purchase their prescription medicines also through online pharmacies and over the past few years, online pharmacies have become more common in Finland (Finnish Medicines Agency 2019). Although only a minority of the online pharmacies in Finland currently sell prescription medicines, the trend towards more online e-prescription purchases is likely to increase in the future. Online pharmacies offer the potential to ensure that medicines can be distributed to remote areas. Even though the implementation of e-prescriptions, My Kanta and other Kanta services seems to have been a successful reform, we are still in the initial stages of the digitalization of healthcare. Digital services should be developed by prioritizing medication safety and customers' parity, so that patients behind the digital divide are not excluded from healthcare services.

6.1.2 Pharmacy customers' experiences with the My Kanta service

Most of the studied pharmacy customers had heard about the My Kanta service and the majority of them had also viewed their e-prescriptions on it. The users were satisfied with the usability and the usefulness of the service. However, a notable number of the study participants were unfamiliar with My Kanta.

The majority of the adult Finnish citizens have both Internet access and an ID for electronic services, in other words, tools for using the My Kanta service (Hyppönen et al. 2014, Hyppönen et al. 2018). In 2015, nearly all citizens aged less than 65 years used the Internet (Tilastokeskus 2015). In addition to technical readiness, most working-age citizens are not intimidated by web-based and information technology and have the ability to use e-health services (Jauhiainen et al. 2014, Hyppönen et al. 2018). Thus, the reason why the My Kanta service was under-utilized by its potential users in this study population, was probably not because of a lack of technical skills or opportunities but rather because they had received insufficient information about the service. However, the use of the nationwide patient portal among our study population was rather high compared with citizens of Denmark, Australia and Estonia, where the annual user-rate of each country in 2015 was lower than 5% of the citizens who could log into the portal (Nøhr et al. 2017).

Patients' unawareness of this kind of portal's existence is a common reason for not using the service, even among those who use the Internet (Ronda et al. 2014, Turvey et al. 2014). In the US, aggressive marketing of an online patient portal using various strategies, such as oral and written information, postcard and letter mailings, posters, and advertisements tripled the portal's adoption (Yamin et al. 2011). A Belgian survey found that only a small number of study participants were aware of the recently introduced national patient portal for viewing e-prescriptions (Suykerbuyk et al. 2018). In this respect, it is crucial that public promotion and informing patients is planned and carried out carefully when implementing e-health services.

Although potential patient portal users need to be informed about the service, they should also be motivated to use it (Goel et al. 2011). According to the respondents of this study, the My Kanta service was easy to use, provided a good overall picture of prescribed medications, and was convenient for checking the current status of their prescriptions. In addition to prescription information, the service includes EHRs of the patient and other useful functions related to his/her care (Table 2). Thus, information, motivation and assistance should be extended to patients especially from healthcare providers. Patients should also be provided with practical education on how to use My Kanta. In fact, the Kanta services do offer online training in My Kanta usage (Kanta 2019h), but this does not seem to be widely utilized by many patients.

According to this study, those respondents aged 75 and older were less likely to know or use My Kanta compared with their younger counterparts. In fact, in general, many individuals in this age group do not use the Internet at all (Tilastokeskus 2015). It is likely that we will always have patients who cannot or refuse to use electronic devices. Thus, in the future, their needs should be better taken into consideration. The study respondents, especially the oldest ones, most often checked the status of their e-prescriptions by asking at the pharmacy or by reading the dispensing label affixed to the medication package. Verbal and written information offered actively by healthcare professionals will still be valuable for customers not using the Internet, but it would be important to clarify which methods they would prefer in managing their prescription information.

Since this study was conducted, Finnish e-prescription services have appeared increasingly in both traditional and social media and now reach people more widely than reported in this study. For example, during 2016–2017, one million new users logged into the My Kanta service and the cumulative number of log-ins had tripled as compared with the year 2015 when this present project was conducted (Jormanainen 2018). Altogether nearly 2.4 million citizens had logged into the service at least once at the end of 2017. Furthermore, the My Kanta service has continuously been developed and updated after this study was conducted (Kanta 2018b). The most recent My Kanta feature under development is My Kanta Personal Health Record, in which the patient may enter information on his/her health and well-being such as measurements of lifestyle and activity records (Kanta 2019i). If the patient gives permission, then this data can be accessed by social and healthcare providers.

Lack of information on a patient's current medications is a widely recognized high-risk for patient safety (Hakoinen et al. 2017, World Health Organization 2017). According to Finnish primary care physicians, one of the main problems in e-prescriptions is the incoherence of patient's prescription information in the Prescription Centre (Kauppinen et al. 2017b). The information is not congruent with EMRs and there are unnecessary e-prescriptions resulting from technical difficulties in correcting and cancelling prescriptions. One aspect that makes it even more confusing for the management of a patient's overall medication is that patients tend to use medications differently from prescriber's instructions (e.g. see Sabaté 2003,

Pasina et al. 2014, Tiihonen et al. 2016). Furthermore, over-the-counter medicines, herbal remedies and dietary supplements are rarely entered into the patient's medical records. One of the most important features under development in My Kanta is a medication list of the patient's overall medication regimen, which can be updated by healthcare professionals or by the patient himself/herself (Virkkunen et al. 2018). The medication list will provide consistent information on patient's current medication to the patient and all healthcare providers taking care of him/her. Consequently, when there will be this tool in My Kanta for managing a patient's overall medication list in an accurate and up-to-date manner, it is important to engage and educate patients themselves to update the information and enter other personal health data into the service (Ministry of Social Affairs and Health 2018). Equally, patients unable to use My Kanta should be provided with assistance to update their records. At the moment, the e-prescription system lacks an appropriate tool for communication between physicians and pharmacies (Kangas et al. 2018). In the future, pharmacies could help those patients unable to use My Kanta to complete their medication list and forward the necessary information from the patient to other healthcare providers.

According to a recent population survey, every third Finnish citizen has viewed their EHRs and every fifth has sent a renewal request of an e-prescription via an online service (Hyppönen et al. 2018). Future studies should produce up-to-date information on how extensively My Kanta is used and by whom, and how the users perceive the usability of the service. Furthermore, it would be valuable to explore the barriers to the use of My Kanta and how the service could be improved. For example, a My Kanta mobile application could increase user rates. According to Bell et al. (2018), patients, especially younger individuals, were more likely to use a patient portal via a mobile app than a website. In addition, My Kanta is still without a secure messaging tool, which has been regarded favorably among US patients (Wade-Vuturo et al. 2013, Haun et al. 2015, Sieck et al. 2018). Messaging with healthcare providers about minor health issues or follow-up news could save both patients' and providers' time, and resources. Finnish primary care physicians have claimed that the opportunity to communicate with patients via My Kanta would be useful, especially for e-prescription renewals (Korhonen et al. 2019). Physicians would like to receive follow-up information such as blood pressure readings, when was the last time that the patient visited a physician or whether any side effect had occurred. However, the deployment of a secure messaging tool would require clear instructions and rules for messaging both for patients and healthcare providers (Wade-Vuturo et al. 2013, Haun et al. 2015, Sieck et al. 2018).

Another question is how will patients adopt and adapt to their new participative role in the era of e-health? Several studies have found higher levels of education to be a significant predictor of patient portal use (Ronda et al. 2013, Ancker et al. 2015, Hyppönen et al. 2014, Jhamb et al. 2015, Smith et al. 2015). In addition, a higher level of health literacy is related to a more extensive use of the Internet, especially in searching for health information (Levy et al. 2014). The results of this study revealed

a significant association between pharmacy customers' education and their familiarity with My Kanta. However, there was no significant association between respondents' education and the actual use of My Kanta. Nevertheless, it should be considered whether practical education on the use of e-health services should be included in the curriculum of Finnish comprehensive schools.

6.2 METHODOLOGICAL CONSIDERATIONS

This study adds valuable information to the somewhat neglected field of medicine users' experiences with e-prescriptions. A major strength of this study is that the results are based on a fully operational nationwide e-prescription system, which, from a global point of view, is rather unique and sophisticated. The earlier scientific literature on these systems is limited. The use of e-prescriptions became mandatory for all Finnish healthcare providers at the beginning of 2017, but the proportion of e-prescriptions was already very high, over 90%, in the study year 2015 (Finnish Medicines Agency and Social Insurance Institution 2017, Kanta 2019c). Nonetheless, the results reported in this study are based on the early experiences with the Finnish e-prescription system.

The study explored medicine users' experiences with e-prescriptions via a questionnaire survey distributed from pharmacies after dispensing an e-prescribed medication. The method was suitable for reaching the target population, i.e. medicine users' who have experiences with the system. The study sample was large and covered the whole country. Because questionnaires were distributed by pharmacists, it remains unknown to whom the form was offered and who accepted it. Due to the anonymous form of recruitment, it was impossible to send reminders, which could have increased the number of responses (Tolonen 2006). The response rate of 44% is lower than the value often recommended for successful population surveys. The rate, however, corresponds with that of three other surveys among Finnish customers purchasing prescription medicines from pharmacies conducted with similar methods (Heikkilä et al. 2007, Tiihonen et al. 2007, Nokelainen et al. 2019). In fact, response rates have generally been declining during the past few decades (Tolonen 2006, Beullens et al. 2018).

Due to the way that the questionnaire distribution was carried out by pharmacists, the sample may be biased. There are no statistics available on Finnish pharmacy customers' background information. Nevertheless, the respondents' distribution by gender, age and use of prescription medicines was similar to those surveyed in other studies conducted with similar methods (Heikkilä et al. 2007, Nokelainen et al. 2019). Consequently, it can be assumed that the study population represents well customers purchasing prescription medicines in Finnish pharmacies.

The questionnaire lacked any validated measurements. However, previous studies (Hyppönen et al. 2006, Heikkilä 2013) were utilized in the design of the questionnaire, and the Likert scale question used to assess the respondent's overall

satisfaction with e-prescriptions (Question 21 in Appendix 1) had earlier been utilized by Hammar et al. (2011) and Kauppinen et al. (2017b and 2018). The questionnaire and its administration were pre-tested in a pharmacy. The pilot respondents were interviewed afterwards to ensure that they had truly understood the questions. Minor modifications were made based on the pilot survey. The majority of the study respondents (94–99%) answered all of the structured questions that they were requested to answer, and therefore it can be assumed that the questions were understandable (Turunen 2008). However, the questionnaire had also some limitations. The first two statements of the My Kanta Likert scale (Question 20 in Appendix 1) included two different adjectives (easy and effortless, clear and understandable) in one statement which was a methodological mistake. In addition, one response alternative concerning pieces of information that respondent had become acquainted with included two different measures (from where and how) (Alternative 3 of the question 12 in Appendix 1). Pharmacy customers' experiences with e-prescriptions have been poorly explored and therefore many questions of this study were generally formulated. Further studies with more open-ended questions or conducted with qualitative methods will be needed to gain in-depth knowledge on customers' understanding of the e-prescription system.

7   CONCLUSIONS

Based on the results of this thesis, the following conclusions can be drawn:

1. From pharmacy customers' point of view, purchasing prescription medicines with e-prescriptions, renewing e-prescriptions in a pharmacy, and acting on behalf of another person had all been successful. Problems or inconveniences were rarely encountered.

2. Most pharmacy customers are familiar with the My Kanta service. Many of them have also used the service for viewing their e-prescriptions. My Kanta users are satisfied with the usability and usefulness of the service. Nevertheless, there are still potential users who have not received information or have not had enough motivation to use the service. Some customers are not able to use the service at all.

3. Pharmacy customers are mainly satisfied with the information they had received about e-prescriptions. Their knowledge, however, only partly fulfils the national requirements. Customers have most often become acquainted with how to use e-prescriptions, their benefits, and how to view them on a computer. Information concerns are related to data protection and data security.

4. In general, one can state that the pharmacy customers' participating in this study were very satisfied with the recently implemented e-prescribing system operating in Finland.

8   IMPLICATIONS

8.1   PRACTICAL IMPLICATIONS

1. Pharmacy customers will still need further information about the nationwide e-prescription system, because the system is being continuously developed and there will always be new users of the service. Customers would like to know more about how their personal information is secured. Even though the legal obligation to provide information about the system is restricted to only the healthcare unit issuing the patient's first e-prescription, information should also be actively offered from pharmacies, where medicine users visit regularly.

2. The My Kanta service should be better promoted among medicine users. Healthcare professionals and the providers of the Kanta services should motivate and educate the medicine users on how to use the service so that they can become more involved in their own care.

3. Equally, those who cannot or are reluctant to use My Kanta will need oral and written information about their health records and e-prescriptions from healthcare providers and pharmacies. It should be noted that there will always be patient groups who will be unable to use the online service, e.g. patients with visual or cognitive impairments.

4. Other countries implementing e-prescribing systems should thoroughly plan and carefully carry out the dissemination of information to lay people. Information should be provided repeatedly and consistently by all healthcare providers and pharmacies, and these professionals should also be well trained to meet their obligations.

8.2   SUGGESTIONS FOR FUTURE RESEARCH

1. It is still unclear how the implementation of e-prescriptions has affected medication safety from the perspective of pharmacy customers. Since many of the problems that pharmacy customers encountered with e-prescriptions resulted from their unawareness of the current status of their e-prescriptions, future studies should explore whether customers feel that they are experiencing difficulties in keeping up to date with their prescribed medications and how they would like to check them. The possible effects on prescribing patterns and medicine use should also be examined.

2. The Finnish e-prescription system is being continually developed, so pharmacy customers' perceptions should be further investigated. Qualitative data will be required to better understand pharmacy customers' experiences and awareness of the e-prescription system. Interview or focus group studies could reveal how customers perceive e-prescribing or how they view its security. Improvement ideas from pharmacy customers would be valuable for the further development of the system.

3. Health policy strategies in Finland and worldwide are striving for more and more patient engagement; patients should be more participative, active actors in their care. More in-depth data on the use, usability, and advantages of the My Kanta service are needed to evaluate further how the service can empower and engage patients in their own care. Future studies should explore how e-health-related empowerment occurs from the patients' perspective and how the patients themselves perceive their new role.

4. Future research should also focus on why some patients refuse or cannot use My Kanta, e.g. whether there are factors, health literacy level, affecting the usage. Non-users' thoughts on how the service could be improved should also be investigated to maximize its utilization.

5. Finally, after the implementation and adoption of the Finnish ensemble of e-health services, a fundamental question arises on whether these national investments have influenced health outcomes and healthcare costs?

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APPENDICES

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Questionnaire study for pharmacy customers regarding electronic prescriptions (e-prescriptions)

Answer the questions by circling the number of the most suitable alternative. If necessary, write the answer or the reason for the answer in the space provided. It is important for the study that you answer all the questions.

1. Estimate how many times you have purchased medication with an e-prescription <u>in the last six months</u>

1   This was the first time
2   2–5 times
3   6–10 times
4   More than 10 times

2. Did you have any problems with your e-prescription(s) <u>this time at the pharmacy</u>?

1   No
2   Yes. What kind? You may choose several alternatives if you had problems with several e-prescriptions.
    a.   The physician had not sent the e-prescription as promised
    b.   The e-prescription had expired without my knowledge
    c.   The e-prescription had no medication remaining and I didn't know this
    d.   The e-prescription was erroneous or lacked information, so the pharmacist had to contact the physician
    e.   Something else. Please specify _____

_____

3. Have you <u>usually</u> received a patient information sheet concerning your e-prescription(s) from a physician?

1   Yes
2   No, the physician has not given me a patient information sheet → go to question **5.**
3   No, because I haven't wanted a patient information sheet → go to question **5.**
4   I don't know what a patient information sheet is → go to question **5.**

4. In your opinion, was the content of the patient information sheet clear?

1   Yes
2   No. Why not? _____

_____

5. How do you check the status of your e-prescription(s)? (e.g., amount of medication remaining or expiry date of a prescription). You may choose several alternatives.

1   I do not check it at all
2   I use the online My Kanta service
3   I ask at the pharmacy
4   I read the label affixed to the medication package
5   I read the patient information sheet
6   I keep track of it myself
7   I use another method. Please specify the method you use _____

6. Were you told how much medication is remaining on your e-prescription(s) <u>this time at the pharmacy</u>?

   1   Yes
   2   No

7. Have you renewed your e-prescription(s) through the pharmacy?

   1   Yes
   2   No → go to question **9.**

8. How well has renewing your e-prescription(s) through the pharmacy succeeded?
   1   There have been no problems in renewing
   2   There have been problems in renewing. Please specify _____

   _____

9. Have you purchased medication with an e-prescription for another person? (e.g., a child, spouse or other family member)

   1   Yes
   2   No → go to question **11.**

10. Have you succeeded in taking care of an e-prescription for another person?

   1   Yes
   2   No. What kinds of problems have you encountered? _____

   _____

11. From whom/where have you learned about e-prescriptions? You may choose several alternatives.

   1   From no-one/nowhere → go to question **14.**
   2   A nurse
   3   A physician
   4   A receptionist (at a health centre, medical clinic, hospital)
   5   Pharmacy staff
   6   A relative/friend
   7   The media (TV, radio, newspaper)
   8   On the Internet
   9   A brochure
   10 Somewhere else. Please specify where _____

12. What did you learn about? Circle all the alternatives that apply.

   1   The benefits of e-prescriptions for customers
   2   Where e-prescriptions are stored
   3   From where and how I can purchase my medication prescribed with an e-prescription
   4   How another person can purchase my medication prescribed with an e-prescription for me
   5   How I can check my prescription information on a computer
   6   Who can view my e-prescription information
   7   For what purposes my e-prescription information can be used
   8   How my e-prescription information is protected against misuse
   9   My right to limit the viewing of my e-prescription information
   10 Which authorities arrange services related to e-prescriptions

13. Do you feel you have received <u>sufficient</u> information about e-prescriptions?

    1   Yes
    2   No. What more information would you like? _____

    _____

14. What is your opinion on the following statements? Circle the most suitable alternative for each statement.

	I fully agree	I agree to some extent	I disagree to some extent	I fully disagree	I don't know
It is safe to use e-prescriptions	1	2	3	4	5
It is important for a physician to be able to see what medication other physicians have prescribed for me with e-prescriptions	1	2	3	4	5
It is important for a pharmacy's pharmacist to be able to see all medications prescribed for me with e-prescriptions	1	2	3	4	5
I'm afraid an unauthorized person may view or use my prescription information	1	2	3	4	5
I'm afraid my e-prescription information may be misused	1	2	3	4	5

15. What <u>benefits have you had</u> from using e-prescriptions compared with paper prescriptions?

_____

_____

_____

16. What <u>problems have you had</u> in using e-prescriptions compared with paper prescriptions?

_____

_____

_____

The *My Kanta service* is a Finnish online service intended for adult customers (www.kanta.fi/omakanta), where it is possible to check one's own personal prescription and patient information by logging on with a bank code or other form of identity verification.

17. Are you familiar with the My Kanta service?

    1   Yes
    2   No   → go to question **21.**

18. Have you used My Kanta to <u>view your e-prescription information</u>?

    1   Yes
    2   No   → go to question **21.**

19. Have you printed out a <u>summary of your e-prescriptions</u> from My Kanta?
    1   Yes
    2   No

20. What is your opinion on the following statements? Circle the most suitable alternative for each statement.

	I fully agree	I agree to some extent	I disagree to some extent	I fully disagree	I don't know
It is easy and effortless to log on to My Kanta	1	2	3	4	5
The My Kanta pages are clear and understandable	1	2	3	4	5
It is easy to check the amount of medication remaining on a prescription with My Kanta	1	2	3	4	5
It is easy to check the expiry of a prescription with My Kanta	1	2	3	4	5
It is easy to check if my prescription was renewed with My Kanta	1	2	3	4	5
With My Kanta it is easy to see at which pharmacies and/or healthcare units my e-prescriptions have been viewed	1	2	3	4	5
My Kanta provides a good overall picture of the medications prescribed for me	1	2	3	4	5
My Kanta works without any problems	1	2	3	4	5

21. How satisfied are you with e-prescriptions as a whole? Circle the most suitable alternative.

Not at all satisfied   Very satisfied
1   2   3   4   5   6

22. Your gender?

1   Male
2   Female

23. Your year of birth? 19_____

24. Where do you live?

1   Southern Finland
2   Southwestern Finland
3   Western or Central Finland
4   Eastern Finland
5   Northern Finland
6   Lapland

25. Your education?

1   Basic education (comprehensive school)
2   Vocational qualification
3   Upper secondary school graduate
4   Lower-level university degree
5   Higher-level university degree

26. Are you currently using

1   Prescription medication regularly (e.g., high blood pressure medication)
2   Prescription medication only temporarily (e.g., antibiotic, painkiller)
3   Both

You can write any comments you have about this questionnaire and your experiences with e-prescriptions and the My Kanta service in the space below. If necessary, you can also write on the back of the cover letter and return it together with this questionnaire form.

_____
_____
_____
_____
_____
_____

Thank you!

ELINA LÄMSÄ

Finland introduced a legally-binding nationwide electronic prescription system during 2010–2017. This thesis explored Finnish pharmacy customers' experiences with electronic prescriptions and the My Kanta web service, assessing the information that customers had received about the system. Customers' experiences were investigated by the means of a questionnaire survey conducted in autumn 2015.

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