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E-health and e-welfare of Finland

Check Point 2018

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Editors
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E-health and e-welfare of Finland

Check Point 2018

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Abstract

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The Finnish Ministry of Social Affairs and Health has regularly commissioned national surveys on e-health and e-welfare to monitor state of the art and trends in e-health and e-welfare in Finland to gain evidence for development. The results of the latest data collection round in spring 2017 have been published in numerous national reports and international articles. For the first time, results from 2010, 2014 and 2017 were also published as dynamic database reports (www.thl.fi/digikyselyt). The report at hand was produced mainly for the international benchmarking as a compilation of main results.

The report was produced by the Finnish National Institute for Health and Welfare (THL), FinnTelemedicum research unit at the University of Oulu, Aalto University, University of Eastern Finland (UEF) and the Finnish Medical Association.

At the time of the data collection in spring 2017, the national e-services (Kanta services) in healthcare were already in common use. The national e-prescription (Prescription Centre) and MyKanta Pages for citizen had become established in all of public healthcare and in most of private healthcare providers. The Patient Data Repository was used in all of public healthcare and in many of private healthcare providers. Kanta services for social services were ready to be deployed and implemented, and the national Kanta PHR was in its pilot phase. The Information Strategy for Social and Health Care 2020, published in the beginning of 2015, was being implemented.

The indicators used for monitoring have been developed in collaboration with the Nordic countries and the OECD, and offer good basis for international e-health and e-welfare benchmarking. The five surveys of the report have been depicted in table 1.

Table 1. Surveys, their foci, informants and frequencies.

Survey	Focus	Informants	Years
1) e-health	e-health implementation and use	Public primary and secondary and private healthcare provider organisations	2003, 2005, 2007, 2011, 2014, 2017
2) e-welfare	e-welfare implementation and use	Public and private social service organisations	2001, 2010, 2014, 2017
3) Physicians' experiences	Usability, experienced benefits and challenges	Public and private physicians	2010, 2014, 2017
4) Nurses' experiences	Usability, experienced benefits and challenges	Nurses working in public and private health care and social services	2017
5) Citizens' experiences	Use, experiences and needs of e-services	Representative sample of population	2014, 2017

The e-health survey (1) includes data from all the public hospital districts delivering secondary or tertiary care and 86% of the public healthcare centres delivering primary care (population coverage 95%). A sample of private sector service providers is also included. The e-welfare survey (2) focused on mapping the information exchange in social services, organisations that had joined the Kanta services and availability of digital social services for citizens. It included all public and private social service providers in Finland. Public social service respondent organisations covered 46% of all the municipalities and nearly fifth of private organisations. The survey of physician experiences (3) was addressed to all working age physicians in clinical work in Finland. The survey focused on e.g. technical quality, ease of use and IT support for management with 22% response rate. The same study on nurses' experiences (4) was conducted for the first time in 2017. This survey assessed the usability of health and social care information systems and further, explored the proficiency of use among nurses. Response rate was 12%, but the sample represented those nurses well who were employed in public hospitals, healthcare centres, private sector and social care. The survey of citizen experiences (5) response rate 47%, describes citizens' ability to use e-services and furthermore, barriers and benefits of use. In this survey, citizens had already more experiences in using the national My Kanta Pages service.

According to the results of the e-health survey, information exchange has increased and regionally information flow between primary and secondary care is more fluent. The Finnish health care is highly digitalized also among private sector service providers. There are also more e-health services available for citizens. However, with a large amount of data available, intelligent use of it needs further improvement.

According to the e-welfare survey, no significant changes had occurred in the information management and information system development in social services compared to the situation in 2014. However, cooperation between public and pri-

vate sector and e-services targeted for citizens had increased since 2014. Still, some of the private sector service providers did not have a client information system in use. This is a significant observation when considering the national client data repository that is currently under work. Further, it seems that professionals do not have sufficient tools for information management.

According to the physician survey, slight improvements were seen among public sector physicians in their satisfaction to EPR system's ease of use and technical quality in 2017. In the private sector, physicians were more satisfied with their EPR systems than their colleagues in public healthcare. In health information exchange, paper was used less compared to earlier surveys. Obtaining prescription data from other organisations was perceived easier due to implementation of national Kanta and e-prescription services. However, obtaining patient data from other organisations was still perceived time consuming.

The survey on nurses' experiences revealed that nurses rate themselves as proficient users when assessing their informatics competencies. However, there are issues in information flow that do not support nurses work processes. A concerning finding was that information systems were not experienced to support nurse-patient relationship.

The results of the survey of citizens' experiences showed that majority of the citizens were able to use e-services, but there are still people who are unable to use e-services. It would be important to deal with the barriers of use to prevent digital exclusion. E-services for citizens form the most often used e-service functionalities in healthcare.

Even if the Finnish social services and healthcare are already highly digitalized, more effort and investments on e-service development are still needed to ensure equal access to e-services. It is important to consider health data security. Further, development of indicators for monitoring healthcare digitalization are needed. Information on usability of client information systems is needed to steer development of Kanta services for social services. From the professionals' perspective, information exchange and interoperability between information systems needs to be improved to minimize multiple documenting of the same thing and to facilitate search of the relevant information. Moreover, it is important to improve the quality of e-services targeted to citizens to meet their needs better.

The surveys have produced monitoring information already during several years for information system suppliers and decision-makers about evidence-based development of digital work and services. This research entity is globally unique in its coverage and systemic way of producing knowledge.

Keywords: information and communication technology, e-health, healthcare services, e-welfare, social welfare, social services, electronic patient record systems, telemedicine, regional patient data repositories, national patient data archive, ICT, electronic information management, client information systems, client information, health information system, classification, online services, survey, benchmarking

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Introduction to the STEPS project

Ministry of Social affairs and Health (STM) has since 2003 regularly commissioned THL to assess status and trends of e-services on a national level in Finland. The studies have provided decision makers evidence for steering the national and regional development of e-health and e-welfare solutions and services as well as benchmarking data for EHR development for vendors. The THL-led studies have been conducted in close collaboration with universities (University of Oulu – responsible for e-health availability surveys, University of Eastern Finland UEF – responsible for the social care organisation and nurses experience surveys, University of Lapland in 2020 – to be responsible for social care organisation and professional surveys) and Aalto University – responsible for usability expertize. Collaboration with professional associations (Finnish Medical Association FMA, Finnish Nurses Association FNA, The Union of Health and Social Care Professionals Tehy and in 2020 also with Talentia Union of Professional Social Workers) has been essential to guarantee controlled access to professionals as well as expertize in survey instrument development. Studies have been co-funded with the Ministry and partners with approximately 50% funding from the Ministry and the rest from the partners.

The national data collection rounds have been timed in a way that they provide baseline, assessment or evaluation data related to key national e-health and e-welfare policy goals:

- implementation of the first e-health and e-welfare strategy in 1995
- e-welfare programme and the National Project for Securing the Future of Health Care in the beginning of 2000’s, halfway through the national project in 2005 and at the end of the national project in 2007
- when legislation on handling electronic patient information (national e-prescription and Kanta services with patient data repository) was issued in 2010
- when the e-prescription was fully implemented in public health care in 2013
- when ‘e-health and e-welfare strategy 2020’ and legislation on social welfare client documentation were issued in 2014
- and when the patient data repository was fully implemented in the public sector in 2017.

The results have been reported in THL report-series and peer-reviewed articles, with a collated THL-report in English since 2006 (Hämäläinen et al 2006, Hämäläinen et al 2008, Hämäläinen et al 2011, Hyppönen et al 2015). In the 2017 survey round, the results were also databased for quick, dynamic reporting of results. The databased reporting includes the data cubes and ready-made database reports, which are graphic or table compilations of key data on a subject area (THL, 2018). The databased results enable users to view measures of interest by background variables of interest, also monitoring evolvement of results in time.

The survey instruments have been kept as similar as possible to enable comparison to previous data collections, but updated each round with questions related to new e-service functionalities. Saturated measures have also been left out. Development of the instruments has been done in collaboration with the OECD model survey development as well as with the Nordic e-health Research Network. The survey used to monitor user experiences for physicians has also been validated (Hyppönen et al. 2019), offering a good basis for international use and comparisons. The instrument has been used already in Iceland and Germany, and also Australia has expressed interest in using it.

In the first year (2003), the data collection comprised one national level survey for monitoring availability and use of EPRs, e-health systems and functionalities in collaboration with University of Oulu. This study was directed to health care organisation representatives (CIOs, or medical directors/ chief physicians). It has been repeated since between 2–3 year intervals (in 2005, 2007, 2010, 2014 and 2017). Since 2010, a simultaneous e-welfare system and service availability survey was conducted also for social welfare organisations, in collaboration with University of Eastern Finland.

In 2010, a third survey was introduced to monitor user experiences, benefits and barriers of use. This survey was directed to physicians in 2010 in collaboration with the FMA and Aalto University. The data collection was again conducted simultaneously with the availability surveys, also matching the questions to the available functionalities, making it possible to combine the data sets for assessing covariation of availability, use and usability. At this time, the survey palette had grown from individual projects to a monitoring programme with three projects. The programme was named STePS, "Social and Healthcare e-service Monitoring" (Sosiaali- ja Terveydenhuollon e-palveluiden Seuranta) (thl.fi/stepsproject).

In 2014, STePS 1.0 was launched, repeating the three surveys and introducing a fourth national level survey to monitor citizen experiences of e-health and e-welfare services. The citizen survey was developed as a module to another national THL-led population study Adult population health, welfare and service use (ATH) in order to get extensive background data about the sosioeconomical status, health and service use of respondents for the e-health and e-welfare module variables.

The current reporting comprises the results of STePS 2.0 data collection in 2017. This time yet another survey was introduced, monitoring nurses' experiences of e-health and e-welfare systems and functionalities, in collaboration with FNA, Tehy and UEF.

Next data collection round in 2020 has been agreed upon with the ministry and the collaborating organisations, introducing a further user experience study focusing on social workers in collaboration with University of Lapland and Talentia. This round will be the last to be conducted on project basis. During the 2020–2023 project, the Ministry of Social Affairs and Health (STM) has suggested negotiations to make the e-health and e-welfare monitoring a permanent activity of THL.

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Suomalaiselle lukijalle (For the Finnish reader)

Sosiaali- ja terveysministeriö on toimeksiantanut kansallisten kyselyaineistojen keruun ja raportoinnin sähköisten palvelujen tilasta ja kehityssuunnasta. Säännöllisesti kerättyä tutkittua tietoa tarvitaan sähköisten palvelujen kehitystyöhön. Raportissa esitellään toteutetun tiedonkeruun pohjalta kootusti päätuloksia kansainvälisille tutkijoille ja päättäjille. Toivomme, että raportti löytää sosiaali- ja terveydenhuollon sähköisten palvelujen tilasta kiinnostuneet lukijansa myös kotimaassa.

Tutkimukset ja niistä koostettu raportti toteutettiin yhteistyönä Terveyden ja hyvinvoinnin laitoksen (THL), Oulun Yliopiston, Aalto-yliopiston, Itä-Suomen yliopiston (UEF), Suomen sairaanhoitajaliiton ja Suomen Lääkäriliiton kanssa.

Raportin tiedonkeruun aikaan keväällä 2017, Kanta palvelut olivat terveydenhuollossa jo yleisesti käytössä. Kansallinen eResepti (Reseptikeskus) ja Omakanta –sivut kansalaisille olivat vakiinnuttaneet asemansa julkisessa terveydenhuollossa sekä suurimmassa osassa yksityisiä terveydenhuollon palveluntuottajia. Myös potilastiedon arkisto oli käytössä kaikilla terveydenhuollon julkisilla ja useilla yksityisillä palveluntuottajilla. Sosiaalihuollon Kanta-palvelut olivat valmiina käyttöönottoon ja toteutukseen ja kansallinen potilastiedon arkisto oli pilotointivaiheessa. Kansallisen ohjauksen näkökulmasta voidaan mainita että Sote-tieto hyötykäyttöön -strategia 2020 oli toteutuksessa tiedonkeruun aikaan.

Terveydenhuollon tieto- ja viestintäteknologian käyttöä kartoittava kyselyaineisto kattoi kaikki julkisen sektorin sairaanhoitopiirit, suuren osan julkisen sektorin terveyskeskuksista sekä otoksen yksityisensektorin palveluntarjoajista. Sosiaalihuollon organisaatiokyselyllä kartoitettiin esimerkiksi tiedonvaihtoa eri toimijoiden välillä ja digitaalisten sosiaalipalveluiden saatavuutta kansalaisille. Kyselyyn vastanneet organisaatiot kattoivat lähes puolet kaikista kunnista ja liki viidenneksen yksityisen sektorin organisaatioista. Lääkäreille suunnatun kyselyn otoksena olivat kaikki työikäiset lääkärit Suomessa ja kysely keskittyi potilastietojärjestelmien tekniseen toimivuuteen, helppokäyttöisyyteen sekä niiden antamaan tiedolla johtamisen tukeen. Kyselyn vastausprosentiksi muodostui 22%. Sairaanhoitajille suunnatussa kyselyssä kartoitettiin asiakas- ja potilastietojärjestelmien käytettävyyttä sekä niiden käytön osaamista sairaanhoitajien keskuudessa. Vaikka vastausprosentti oli melko matala (12%), vastaajat edustivat kuitenkin kohderyhmää hyvin. Kansalaisten kokemuksia kartoittavassa kyselyssä (vastausprosentti 47%), tutkittiin kansalaisten valmiuksia käyttää sähköisiä palveluja. Lisäksi selvitettiin sähköisten palveluiden käytön esteitä ja hyötyjä.

Tieto- ja viestintäteknologian käyttöä kartoittava kysely terveydenhuollon organisaatioille osoitti, että tiedonvaihto organisaatioiden välillä oli lisääntynyt ja sujuvoitunut perusterveydenhuollon ja erikoissairaanhoidon välillä. Sosiaalihuollon osalta taas merkittäviä muutoksia tiedon hallinnassa ja tietojärjestelmien kehittämisessä ei ilmennyt. Lääkärit olivat vuonna 2017 hieman tyytyväisempiä käyttämiensä potilastietojärjestelmien helppokäyttöisyyteen ja tekniseen toimivuuteen. Potilastietojen saaminen Kannasta koettiin helpoksi, mutta toisista organisaatioista tiedonsaanti koettiin edelleen aikaa vieväksi. Tällä tiedonkeruukierroksella ensimmäistä kertaa toteutettu sairaanhoitajien kysely osoitti, että sairaanhoitajat kokevat itsensä kokeneiksi tietojärjestelmien käyttäjiksi, mutta tietojärjestelmät eivät tukeneet potilaan ja sairaanhoitajan välistä vuorovaikutusta. Kansalaisten kokemuksia sähköisistä palveluista kartoittaessa havaittiin, että suurin osa kansalaisista pystyi käyttämään sähköisiä palveluja itsenäisesti. ”Digisyrjäytymisen” ehkäisemiseksi tulisi tarttua asioihin, jotka estävät sähköisten palveluiden käyttöä.

Sosiaali- ja terveydenhuollon digitalisaation monitorointiin käytetyt indikaattorit on kehitetty yhteistyössä muiden Pohjoismaiden sekä OECD:n kanssa. Nämä indikaattorit tarjoavat hyvän pohjan kansainväliseen sähköisten sosiaali- ja terveyspalvelujen sekä sosiaali- ja terveydenhuollon tietojärjestelmien käyttäjäkokemusten vertailuun.

Vuoden 2017 tiedonkeruun tuloksia on julkaistu useissa muissa kotimaisissa raporteissa sekä kansainvälisissä artikkeleissa. Ensimmäistä kertaa vuosien 2010, 2014 ja 2017 tuloksia julkaistiin myös dynaamisina tietokantaraportteina (thl.fi/digikyselyt).

Abbreviations and concepts

Abbreviations	
ATH	*adult population health, welfare and service use survey*
BCP	*business continuity plan*
CIO	*chief information officer*
CDA	*clinical document architecture*
CDS	*clinical decision support*
CIS	*client information system*
CMS	*case management system*
DICOM	*digital imaging and communication in medicine*
ECG	*electrocardiogram*
ECTS	*European Credit Transfer and Accumulation System*
EDI	*electronic data interchange*
EFMI	*the European Federation for Medical Informatics*
EPR	*electronic patient record*
EHR	*electronic health record*
EMR	*electronic medical record*
FinCC	*Finnish Care Classification*
FinnSHIA	*The Finnish Social and Healthcare Informatics Association*
FinSote	*See ATH*
FNA	*Finnish Nurses Association*
FMA	*Finnish Medical association*
FSTeH	*The Finnish Society for Telemedicine and e-health*
GP	*general practitioner*
HIE	*health information exchange*
HIS	*health information systems*
HIT	*health information technology*
HL7	*a set of standards*
ICD-10	*International Statistical Classification of Diseases and Related Health Problems*
ICPC-2	*International Classification of Primary Care – 2nd Edition*
ICT	*information and communication technology*
IMIA	*International Medical Informatics Association*
ISO	*International Organization for Standardization*
Kanta	*The short name of the Finnish National Health Information system*
Kela	*Social Insurance Institution of Finland*
My Kanta Pages	*My Kanta pages give Finnish citizens an access to their electronic prescriptions, medical records, consent management, living will, and organ donation testament.*
LIS	*laboratory information system*
NeRN	*Nordic eHealth Research Network*

NGO	*non-governmental organisation*
OECD	*The Organisation for Economic Co-operation and Development*
PACS	*picture archiving and communication systems*
PHR	*Personal Health Record. A health record where health data and information related to the care of a patient is maintained by the patient. (Wikipedia)*
PKI	*public key infrastructure*
RHIE	*regional health information exchanges*
RIS	*radiological information system*
SITRA	*The Finnish Innovation Fund Sitra*
SMS	*short message service*
SSL	*secure socket layer*
STePS	*programme for social and healthcare e-service monitoring*
STM	*Ministry of Social Affairs and Health*
Tehy	*Union of Health and Social Care Professionals in Finland*
TEKES	*Business Finland, earlier called National Technology Agency*
THL	*National Institute for Health and Welfare*
UEF	*University of Eastern Finland*
Valvira	*National Supervisory Authority for Welfare and Health*
VPN	*virtual private network*
VTT	*Technical Research Centre of Finland*
XML	*extensible markup language*

Definitions

EHR	*electronic health record, is a more longitudinal and comprehensive collection of the health information of individual patient than EPR of EMR. It usually contains all the key data elements like narrative texts, biosignals, laboratory and imaging data and can span over different data repositories. One of the key features of an EHR is that the data is shareable and the system contains information from all clinicians involved in a patient´s care. EHRs can also contain evidence based tools to support decision making and workflow tools to streamline patient care.*
EMR	*electronic medical record, a term used parallel to term EPR, a set of electronic information of a patient created by health service providers in hospitals and ambulatory environments. See also term EPR below.*

EPR	*electronic patient record, an electronic set of information about a single patient. In this report EPR is used to describe the essential core functions of EPR systems, e.g. including physician´s notes, nursing reports, scheduling and administrative functions. Auxillary systems like radiology and laboratory information systems as well as picture archiving and communication systems are discussed separately. Likewise systems for data exchange are discussed separately.*
e-health	*use of information and communication technology locally and at distance in health care*
e-welfare	*use of information and communication technology as well as electronic information management in social care*
Patient portal	*healthcare-related online application that allows patients to interact and communicate with their healthcare providers […]on the internet […] at all hours of the day and night. Currently the definitions between an EPR, a PHR, and a patient portal are blurring.*
Usability, user satisfaction, user experience.	*the ability of the ICTs to have a positive impact on patient care by supporting physicians in achieving their goals with a pleasant user experience. In order to support physicians in their daily clinical work, ICTs need to be compatible with physicians' tasks: the systems should provide the physicians with key (context-matching) functionalities, be efficient (especially in terms of record-keeping and information retrieval), and have intuitive user interfaces. In addition, ICTs should support information exchange, communication and collaboration in clinical work and be interoperable and reliable. Since the clinical ICTs are used in numerous environments, they should also adjust to various user needs and organisational settings.*

1 Finnish healthcare and social care system and ICT-policies

Päivi Hämäläinen, Jarmo Reponen

1.1 The Finnish healthcare and social care system

Finland is a sparsely populated country of 5.5 million inhabitants who live in an area of 338 452 km2 with an average population density of 18 persons/km2 (Statistics Finland, 2018). In the eastern and northern parts of the country the population density is especially low and distances are long. Finland is divided into 311 municipalities. More than half of the municipalities have less than 6000 inhabitants (Väestörekisterikeskus, 2018). The large number of small municipalities with big responsibilities for providing both health and social care services is a unique characteristic of the Finnish health and social service system.

The legal and the economic basis

People living in Finland are covered by the Finnish universal public health and social care system. The constitution states that public authorities shall promote the health of the population and guarantee for everyone – as detailed by an Act of Parliament – adequate social, health and medical services (The Constitution of Finland 731/1999). Municipalities have by law the primary responsibility to organize social and healthcare services for their residents and they have strong decision-making power when organizing services. Legislation sets out the overall structure for the services provision, as functions of the municipalities, health centres and hospital districts (Act on Health Care 1326/2010, Act on Primary Health Care 66/1972, Act on Specialised Medical Care 1062/1989). A portion of the publicly funded health and social care services are purchased from private providers. In addition, the private health and social care providers have occupational healthcare and private citizens as their clients. Private healthcare services are partially reimbursed by the National Social Security Fund when the service is purchased by a private person or an organisation (Ministry of Social Affairs and Health 2018, Teperi et al. 2009).

Health and social services are mainly funded by general tax revenues. The municipalities have a right to collect taxes. The State participates by paying a general, non-earmarked, subsidy to the municipalities. The subsidy payable to a particular municipality is mostly dependent on the age structure of its residents (Ministry of Social Affairs and Health 2018). The overall funding of the Finnish public and private health and social care system has also other mixed features (OECD 2012, Teperi et al. 2009). According to the European System of Integrated Social Protection Statistics (THL 2018a), the overall social protection expenditure in Finland amounted to EUR 69 billion in 2016. Social protection expenditure equalled 32% of gross domestic product (GDP) in 2016. The overall trend has been growing since year 2000. The majority (40%) of the costs are due to cash benefits, which include items such as pensions, child benefits and social assistance, sickness, and also maternity, paternity or parental leave. Especially this proportion has been rising rapidly. The population of Finland is aging, and these demographic changes pose the greatest challenges to the sustainability of the Finnish social protection system.

Health expenditure in Finland amounted to EUR 20.5 billion in 2016. Finnish health expenditure as a proportion of GDP was 9.5% in 2016 (THL 2018b). In 2016, the cost of secondary and tertiary care accounted for 35% of the total costs and the trend is rising. Primary healthcare represented 16.5% of the total costs, medication 12.5%, dental health 4.9%, the private healthcare sector 5.4%, institutional care of the elderly 2.8%, and occupational health and student health together 4.2%, and additional groups of smaller costs. The public sector covered 74.6% of the total healthcare expenditure in 2016. Out of this funding, 26.4% comes from the State, 35.6% from the municipalities (local authorities) and 12.4% from the Social Insurance Institution of Finland (Kela). The main part of the remaining private funding was direct out-of-pocket money paid from households (20.4%). Service charges and the cost of medicines are the main out-of-pocket burden for citizens, since they are not fully covered by reimbursement.

At the end of 2014, health and social services employed a total of 385 482 persons, of whom nearly three quarters (72%) worked in the public sector. Nineteen per cent worked in the private sector and 9 per cent in the third sector (THL 2018c). In this work force there are 21 000 working age physicians, resulting in 262 inhabitants/physician (SNAPS 2016).

Primary healthcare and cure

Public primary healthcare services are either produced by the municipalities themselves or provided in cooperation with other municipalities or purchased from private or public providers. The municipalities of Finland have alone or jointly formed 137 healthcare centres that organize primary health care. Healthcare centres are not necessarily single buildings or single locations. A healthcare centre can be defined as a functional unit or as an organisation that provides primary curative, preventive and public healthcare services to its population. The healthcare centre may also acquire the services either from other healthcare centres or from the private sector. Vouchers can be used for some services. Some municipalities have contracted a company to organise all the services provided by the healthcare centre (Association of Finnish Local and Regional Authorities 2018).

Healthcare centres offer a wide variety of services: outpatient medical care, inpatient care, preventive services, dental care, maternity care, child health care, school health care, family planning, care for the elderly, physiotherapy and occupational health care. Legislation states the responsibilities of healthcare centres but does not define in great detail how the services should be provided (Ministry of Social Affairs and Health 2018, Teperi et al. 2009). The number and type of personnel in each healthcare centre depends on the size of the population it serves and on local circumstances. The staff consists of general practitioners, sometimes medical specialists, nurses, public health nurses, midwives, social workers, dentists, physiotherapists, psychologists, administrative personnel and so on. The inpatient department of a healthcare centre works in much the same way as a hospital department. A typical healthcare centre has 30 to 60 beds. The number of inpatient departments within a healthcare centre varies – large centres have several and can be seen as local hospitals. The majority of patients in these departments are older people and the chronically ill (Mikkola et al. 2015). However, in remote sparsely populated areas, healthcare centres provide rather comprehensive short-term curative inpatient services for the general population. Municipalities provide long-term care in wards at healthcare centres and non-medical long-term care in institutions for older people. The latter are considered part of social welfare services.

Alongside the municipal system there are private and occupational health services (Ministry of Social Affairs and Health 2018). Private healthcare in Finland mainly comprises general practice and specialised outpatient care, which are available mainly in the cities. Private physiotherapy and dental services are also common. Physicians can run a practice within a private company or as a stand-alone practice. 1 500 000 patients had used reimbursed private physician services during the year 2016 (Social Insurance Institution of Finland 2017). One third of the Finnish physicians work part- or full-time in the private sector. Many of them are specialists or general practitioners, whose full-time job is at a public hospital or at a healthcare centre (Finnish Medical Association 2016) Patients do not need a referral to visit private specialists at private clinics. Physicians working at private clinics are allowed to send patients with a referral to either public or private hospitals. The Social Insurance Institution of Finland gives some reimbursement to patient for the costs of private care, but the coverage percent is declining (Act on Sickness Insurance 1224/2004)

Occupational healthcare services are provided to the employee by the employer. Legislation (Occupational Health Care Act 1383/2001) enforces preventive occupation health services, but about 90% of employers also provide at least some curative services that are mostly purchased from the private sector. The Social Insurance Institution of Finland provides partial reimbursement for these visits. Almost 1 728 000 employees were covered by sickness care purchased by employers in 2016 (Social Insurance Institution of Finland 2017, Ministry of Social Affairs and Health 2018). The State is also a health and social care provider. It provides some of the healthcare services to the military, the prisoners and there are two state owned mental hospitals (THL 2018d).

Specialised secondary and tertiary care

In the public healthcare service system patients require a referral to see a specialist except in a case of emergency. Both public outpatient and inpatient secondary care are provided by hospital districts. Each municipality belongs to a particular hospital district that has a central hospital. Each municipality must be a member of a hospital district. Of the central hospitals, five are university hospitals, which also provide specialised tertiary levels of treatment. Each hospital district organises and provides specialised hospital care for the population in its area. Hospital districts can purchase services for their population from other hospital districts, the private sector or from abroad. Finland is currently divided into 20 hospital districts. In addition, the semi-autonomous province of Åland forms its own district (Ministry of Social Affairs and Health 2018, Association of Finnish Local and Regional Authorities 2018).

A hospital district is an administrative entity. In different hospital districts the central hospital may operate in more than one location and it may be supported by regional hospitals as well. The overall number of specialised care hospitals is between 70 and 90 depending on the definitions used in counting. This includes the five university hospitals, 16 other central hospitals and over 40 smaller specialised hospitals. The range of specialised care varies according to the type of hospital. Hospital districts own most of the public hospitals. Some are owned by other municipal arrangements (one city etc.). The population of hospital districts varies between about 43,000 and 1,600,000 inhabitants with the exception of Åland with 29,000 inhabitants (Association of Finnish Local and Regional Authorities 2018). By law, hospital districts also have some administrative responsibilities. The provision of ambulance services is a responsibility of the hospital districts (Act on Health Care 1326/2010, Act on Specialised Medical Care 1062/1989).

There are some private hospitals in the country that mostly provide only beds reserved for short-stay surgery. The conceptual boundary between public and private hospitals is becoming less clear, since in several cases municipalities have also established private hospitals that sell services to both public (i.e. the municipalities and the State) and private customers, while on the other hand, municipalities purchase public care from many private hospitals.

Social care

The laws on social welfare stipulate the social services that municipalities must produce (Social Welfare Act 1301/2014, Child Welfare Act 417/2007, Act on Supporting the Functional Capacity of the Older Population and on Social and Health Services for Older Persons 980/2012). Municipal social welfare work involves the prevention of social problems, maintaining social security, and supporting people's independent living. Municipalities arrange social services, provide social assistance, grant social loans, organise guidance and counselling on social welfare benefits and other forms of social security, and their use and take responsibility for the development of social conditions and solving problems. However, there are cases where services are arranged by federations of municipalities. Municipalities purchase several kinds of social services from private service providers and non-governmental organisations (NGO).

Specific pieces of legislation cover different areas of social care. The social services arranged by municipalities include service such as (Ministry of Social Affairs and Health 2018, Association of Finnish Local and Regional Authorities 2018):

- **Social work:** Social welfare professionals provide guidance, counselling and investigation of social problems and other support measures for individuals, families and communities.
- **Emergency social services:** Handle acute problem situations, such as those involving domestic violence, child neglect or after-care following accidents or crimes.
- **Home services:** Home services provide assistance to older people, people with disabilities, in the event of illness and to families with children to help with coping with everyday life and, for example, in regard to hygiene.
- **Informal care support:** A relative may provide care at home for an older person, a person with a disability or a chronic illness and receive payment.
- **Housing services:** Support may be provided to enable older people or people with disabilities to live at home by arranging for necessary home renovation or service housing.
- **Institutional care:** Provides around-the-clock treatment in an institution for people who would not be able to manage at home using other services. This may comprise long-term, short-term or periodic care.
- **Family care:** This is provided to enable someone in need of assistance and support (such as a child or older person) to be cared for at home and in order to meet their individual needs.
- **Rehabilitation:** All social services involve a rehabilitative approach. Rehabilitative working activities are arranged under municipal social welfare. If a client requires rehabilitation that social services cannot arrange, it is sought elsewhere.
- **Child and family services:** Municipalities arrange child day care, child protection, foster care guidance, child and family advice, family conciliation, paternity checks as well as support to related services, plus conciliation related to child custody and access rights.
- **Services for older people:** Social services required by older people include support for home services and for informal care, and institutional care.
- **Disability services:** People with disabilities mainly use general social services and only when these prove inadequate would they then require special services, such as home services for the home, assistive devices, transport and interpretation.

- **Substance abuse intervention and services:** Preventive work on substance abuse is promoted by spreading awareness on substance free lifestyles. Services dealing with substance abuse provide support, help, treatment and rehabilitation for substance abusers and their family and friends.

Around one third of the overall social services is provided by private social care providers or NGOs (THL 2018e). Around one half of the services to the elderly are provided by the private sector including NGOs (THL 2018f). The majority of services produced by the private providers are financed by the public sector. Finland has over 3000 private social care providers. The most common private social service is assisted-living accommodation for older people followed by home services for older and disabled people. Foster care under child welfare arrangements and institutional childcare are also common private services (THL 2011).

The State also provides some social care services. These include special foster care and Mother-and-child homes and shelters. The Institution responsible for organizing these services is the National Institute for Health and Welfare, THL (THL 2018f).

Governance and authorities in social and health care

Prime Minister Juha Sipilä's cabinet began its period in office in May 2015. The term ended in March 2019. The programme of the cabinet included structural reforms, including the reform of health and social care. Digitalisation was also on the agenda. In the governmental programme health and social care the empowerment of citizens were promoted (Finnish Government 2015). The Ministry of Social Affairs and Health is in charge of the planning, steering and implementation of social and health policy. The ministry's mission is to promote healthy, disability-free life, a healthy working and living environment and gender equality as well as to secure sufficient social and healthcare services and a decent income at different stages of life. The Ministry´s social and health policy strategy 2030 is a cohesive society and sustainable wellbeing. The strategic goals are active inclusion of people, integrated services and benefits, safe and healthy living and working environment, wellbeing in work transformation and financial sustainability (Ministry of Social Affairs and Health 2018).

The administrative branch of the Ministry of Social Affairs and Health includes several independent institutions and agencies that implement the Ministry's objectives in society and participate in Government Programme projects. The Ministry of Social Affairs and Health Group includes the Ministry of Social Affairs and Health, the National Institute of Health and Welfare (THL), the Finnish Institute of Occupational Health (FIOH/TTL), the Radiation and Nuclear Safety Authority (STUK), the Finnish Medicines Agency (Fimea) and the National Supervisory Authority for Welfare and Health (Valvira) (Ministry of Social Affairs and Health 2018).

Some of the institutions and agencies produce research data for parliamentary bill drafting and as a basis for social and health policies and decision-making. Some of the government agencies act as licencing and supervisory authorities. In addition, two councillors work in connection with the ministry and there are several advisory committees and boards within its administrative branch. The Ministry coordinates activities in the administrative branch through a management group comprised of the top management of the ministry, agencies and institutions. The ministry signs a four-year performance agreement with several of the agencies and institutions.

The duties of the **Finnish Medicines Agency (Fimea)** include pharmaceutical licensing and monitoring duties, research and development (R&D) and producing and distributing pharmaceutical information to improve pharmaceutical services and the effectiveness of pharmacotherapy. **The National Supervisory Authority for Welfare and Health (Valvira)** is the permit and supervisory authority in the social welfare and healthcare sector. Valvira guides and monitors the activities of social welfare and healthcare professionals and NGOs and deals with complaints within the sector in accordance with the division of duties with the Regional State Administrative Agencies. The duties of Valvira further include monitoring that healthcare equipment and devices comply with requirements as well as promoting their safe use.

The National Institute for Health and Welfare (THL) is an R&D institution whose purpose is to promote the wellbeing and health of the population, to prevent diseases and social problems and to develop social welfare and healthcare services. The Institute serves decision-makers in central and local government, actors in the sector, NGOs, the research community and ordinary citizens. It is the official compiler of statistics in its sector and manages the collection and leveraging of the data within its domain. The Institute executes its remit through research, monitoring and evaluation, development, expert opinions, official duties and international cooperation. The **Finnish Institute of Occupational Health** is a multidisciplinary research and expert organisation that promotes occupational health and safety and the wellbeing of employees (Ministry of Social Affairs and Health 2011, 2018).

There are six **Regional State Administrative Agencies in Finland.** The agencies work in close collaboration with local authorities. The agencies' mission is to promote regional equality by carrying out executive, steering and supervisory tasks, also in health and social care issues, laid down in the law. To this end, they aim to strengthen implementation of basic rights and legal protection, access to basic public services, environmental protection, environmental sustainability, and public safety and also to provide a safe and healthy living and working environment in the regions (Regional State Administrative Agencies 2018).

The **Social Insurance Institution of Finland (Kela)** is also an important organisation for the health and social care sector. Kela provides basic social security for all persons resident in Finland throughout the different stages of their lives. Kela operates under the supervision of Parliament. The legal status, responsibilities and administrative structure of Kela are defined in the Act on the Social Insurance Institution (Social Insurance Institution of Finland (Kela) 2018a, Act on Social Insurance Institution 731/2001).

The challenges of the Finnish health and social care system and the health and social care system reform

Demographic change and globalisation of the economy are changing the operational environment of social protection and service delivery, while at the same time challenging established practices. Finland's population is aging faster than that of many other countries. Demographic and regional diversification is increasing, and the municipal and service structure is in a state of transition since the current structure cannot bear the challenges of the ongoing demographic changes, with urbanisation and an aging population leaving local authorities outside the major cities without working-age taxpayers. Moreover, population mobility, new types of working life and forms of interaction between people are changing. Developments in information and communication technology and other technologies challenge the ways in which different functions operate. Currently there are inequalities in the delivery of services within the system and in different parts of the country (Finnish Government 2018, European Commission 2017, OECD 2012).

A health and social care system reform has been on the agenda of several appointed governments. Prime minster Sipilä´s government worked on a plan to put the new health and social care system into operation by 2021. The suggested reform included also a wider reform of the regional government structures. The purpose of the planned reform was to rationalise the organisation of public-sector administration at state, regional and municipal levels. The suggested solution was the centralisation of functions into clear, autonomous regions – 18 counties. The biggest task of the counties would have been to organize health and social care. The aim was a full horizontal and vertical integration of health and social care and the primary and secondary levels of services. The new system was planned to also increase the freedom of choice of the clients especially in primary and dental care. Counties were also planned to be responsible for rescues services, environmental healthcare, regional development duties and tasks related to the promotion of business enterprises (Finnish Government 2018).

The government's suggestion was given to the parliament but was not approved because there was not enough time to clarify some complex constitutional issues before the end of the term of the parliament. Finland will go without an ongoing health and social care reform in to the election of a new parliament in April 2019. However, the need to find solutions to the problems of the health and social care system remain.

1.2 Finnish e-health and e-welfare policies and deployment

The Finnish e-health and e-welfare strategy

The first Finnish national strategy for applying information technology to healthcare and social welfare was introduced in 1995 by the Ministry of Social Affairs and Health, following the initiation of an information technology development programme during Prime Minister Lipponen's first term in office in 1995 (Finnish Government 1995, Ministry of Social Affairs and Health 1995). The strategy was built around the principle of citizen-centred and seamless service structures. One of the main targets of the strategy was the horizontal integration of services (social, primary and secondary care). Citizens and patients were envisioned as informed and participative actors in the healthcare delivery process. The strategy was updated in 1998, placing specific emphasis on adoption of digital patient and client records at all levels of care, combined with nationwide interoperability between distributed legacy systems, and supported by a high level of security and privacy protection (Ministry of Social Affairs and Health 1998). During the past 23 years many efforts have been made to align political visions closer to the everyday routine of health and social care performance. During this roadmap of implementation, the architecture of the solutions has become clearer and many things have been implemented to daily routine operations. Legislation on healthcare information infrastructures has been an important promotor of the developments.

The main points of the original strategic visions from 1996 are still up to date, but the information society readiness and technological possibilities to reach the full benefits of e-health and e-welfare solutions has increased. E-health and e-welfare have been identified as an important tool in modernising the health and social care system. Thus, the Ministry of Social Affairs and Health upgraded the Finnish national e-health and e-welfare strategy, 'Information to support well-being and service renewal, e-health and e-social Strategy 2020' (Ministry of Social Affairs and Health 2015) that was published in January 2015. The strategic objectives by 2020 of the six themes of the Strategy are described below and a visual summary of the Strategy is also given below (Figure 1.1). The current e-Health and e-Welfare situation of Finland is reflected against these strategic objectives in this Checkpoint report.

1. <u>Citizens as service users – doing it yourself:</u> Citizens use online services and produce data for their own use and for that of the professionals; reliable information on well-being and services supporting its utilisation are available; and information on the quality and availability of services is available in all parts of Finland.
2. <u>Professionals – smart systems for capable users:</u> Professionals in social welfare and healthcare have access to information systems that support their work and its operating processes; electronic applications are in use by professionals.

3. Service system – effective utilisation of limited resources: Client and patient information is accessible to professionals and clients irrespective of changes in organisation structures, services and information systems, information management solutions increase the effectiveness and impact of the service system, and the availability and accessibility of the services is improved through electronic solutions.
4. Refinement of information and knowledge management – knowledge-based management: Data sets support the management of service production and decision-making in society in real time and data sets support research, innovation and industrial and commercial activities.
5. Steering and co-operation in information management – from soloists to harmony: The structures for steering and cooperation in the area of information management are clear and support the social welfare and healthcare service reform
6. Infostructure – ensuring a solid foundation: Interoperable and modular architecture, information security i.e. accessibility, integrity and protection of data, ensuring sufficient data connections and cooperation in development and procurement.

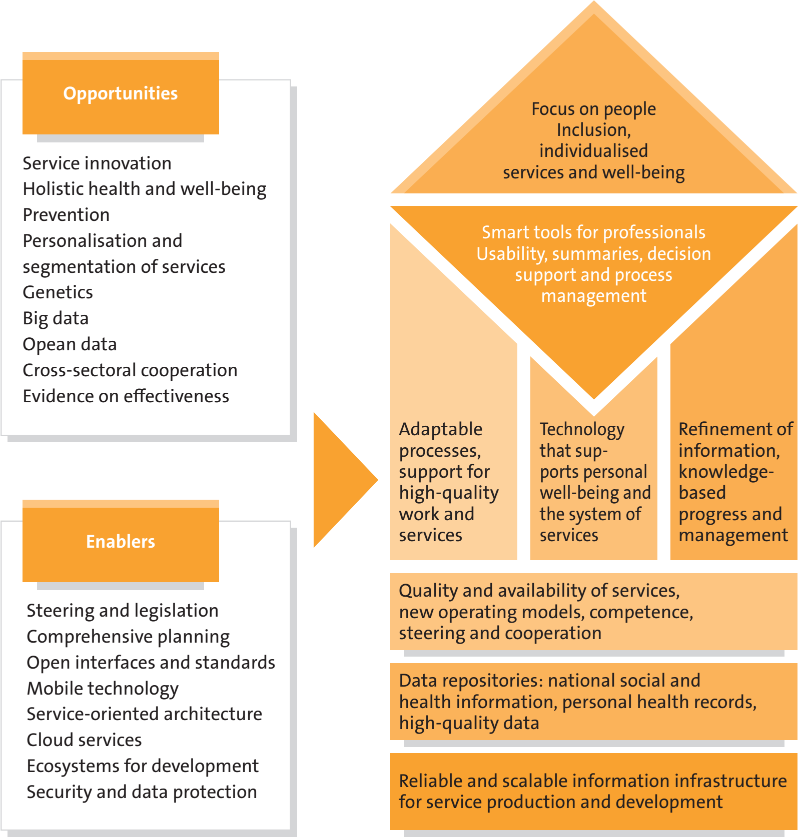

Figure 1.1. Visual summary of the Finnish e-health and e-social Strategy 2020 (Ministry of Social Affairs and Health 2015).

Digitalisation has been one of the themes of Prime Minister Sipilä´s government that came in to office in 2015 after the launch of the e-health and e-welfare strategy. Promoting the implementation of the Strategy was well included in the government´s programme (Finnish Government 2015).

The implementations of the first e-health and e-welfare strategy

The first healthcare project implementing the e-Health strategy was called 'Makropilotti' (from 1998 to 2001) in the hospital district of Satakunta. Eighteen regional projects began in 2004 (Ohtonen 2002, Hämäläinen et al. 2005). Privacy protection regulations, such as the Personal Data Act (523/1999) set conditions on the exchange of information (i.e. patient data) between different register controllers. Running the pilot projects was possible only with the support of a special legislation. The legislation on Experiments with Seamless Service Chains in Social Welfare and Health Care Services was adopted in 2000 (Act 811/2000). The main focus of the legislation was to build regional information service systems and adapters between existing legacy systems.

The interoperability of electronic health records (EHR) was promoted in 2002 by a Decision-in-Principle by the Council of State on securing the future of health care. The document stated that 'nationwide electronic patient records (EPR) will be introduced by the end of 2007' (Finnish Government 2002). The National Health Project Programme was launched and an electronic patient record project was included in the programme. The programme received funding during 2003–2007 to develop the National EPR (Ministry of Social Affairs and Health 2003, 2004). The work included specifications, standardisation and methods to safeguard the data of the ERPs to be used in the country. Several regional projects were launched for the implementation in the hospital districts and municipalities. Many of the projects developed regional e-health information systems, but still different architectural solutions were chosen. No solution for the exchange of data between the regions was developed in the National Health Project (Nykänen et al. 2006, 2008).

The legislative basis for the national infrastructure of e-health and e-welfare

During 2007–2011 a permanent legislation was laid down to regulate the use of electronic social and healthcare client and patient information. The new legislation came into effect in July 2007 (Act 159/2007). The legislation on handling electronic patient information covers centralised archive services(Kanta-services) for health care, encryption and certification services, and patients' access to data. The creation of a common national archiving system (Kanta) was at that time expected to promote patient and client care, confidentiality and higher efficiency in healthcare services. The law made it mandatory for all public healthcare providers to integrate their operations with the electronic archiving system. Private healthcare units that did not use paper-based archives were similarly obligated (Ministry of Social Affairs and Health 2018, Reponen et al. 2009). Legislation on the use of electronic prescriptions also came into effect in 2007 (Act 61/2007) as discussed in more detail later in this chapter.

The Act on electronic social and healthcare client and patient information (Act 159/2007) has been subject to many changes during its implementation phase. The changes have been; corrections due to difficulties in the implementation of the original phrasings of the legislation and due to the addition of new services in to the infrastructure. The main new e-services added are the Patient Summary service and the web based portal that gives direct access to the central services. The latter enables access to services for small services providers and private solo practitioners. Examples of other changes include giving the right for parents to access data on their children. A new major service was included in to this legislation in 2015, the 'Kansa-service', which is an extension of the existing Kanta data repository to also include client documents from social services. An extension to include a personal health record where patients could provide their own data has also been prepared and is waiting for approval by the parliament (Act 250/2014, Act 254/2015, Act 255/2015, HE300/2018, Ministry of Social Affairs and Health 2018).

The current Finnish ICT infrastructure for social and health care

The Finnish ICT infrastructure for health and social care is based on legislation from 2007 and all its later amendments (Act 159/2007). It currently includes Kanta services: My Kanta Pages, Prescription service, Pharmaceutical database, Patient Data Repository and archiving of old patient data (https://www.kanta.fi/what-are-kanta-services). They are hosted by the Social Insurance Institution (Kela). The same public key infrastructure (PKI) system is used for the repository and e-prescription service. It includes strong authentication and a smart ID card for professionals as well as an e-signature. A web-based access system (Kelain) was added in 2016. The architecture integrates national services with the different local electronic patient record systems. My Kanta Pages for the citizens give access to one' electronic patient records and e-Prescriptions. Patients can also access log data on the usage of their data and manage their consents in the My Kanta Pages. A technical solution for a client data archive for social welfare services and a Kanta Personal Health Record (Kanta PHR) have been added in May 2018 (Reponen et al. 2009, Jormanainen 2018).

Other elements of the infrastructure are the National Code Server and the National Pharmaceutical Database. The main functional responsibility areas have been shared between national actors. Kela is responsible for the technical infrastructure of the e-archive and the national e-prescription database. Kela is also responsible for the National Medication database. Cards for identification of professionals are provided by the Population Register Centre (VRK) supported by information provided by Valvira. Nationally standardised codes and classifications are managed by THL and delivered via the National Code Server (Reponen et al. 2009, Mäkelä-Bengs and Vuokko 2013, Jormanainen 2018). The Finnish national e-health and e-welfare infrastructure is shown in figure 1.2. More information on the governance of this system is given later in this chapter.

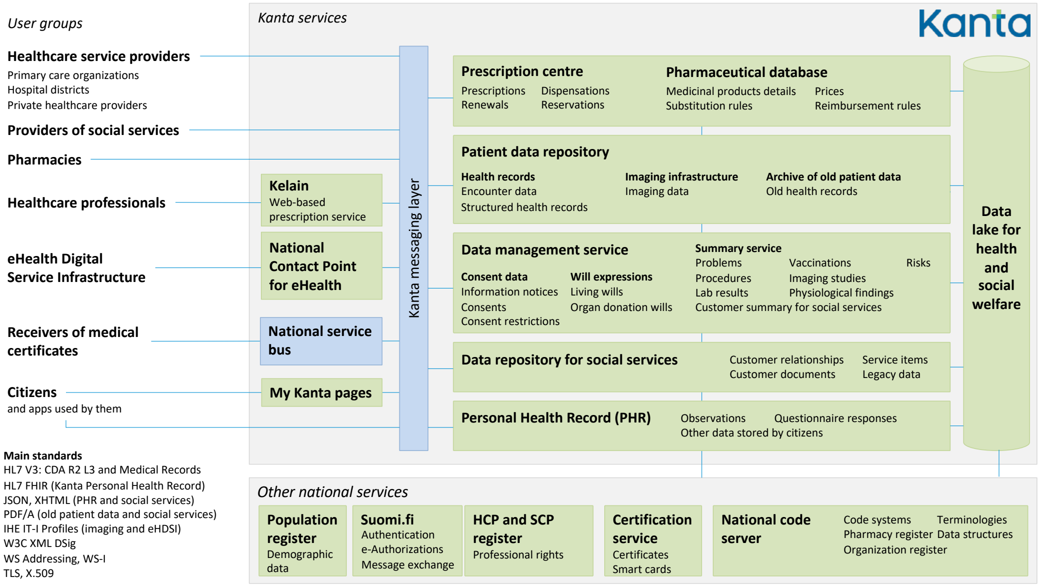

Figure 1.2. Scheme of the most important elements of Kanta services including the national e-prescription and e-archiving system and My Kanta web pages (Social Insurance Institution of Finland (Kela) 2019).

The structured electronic health records

The need for structured data instead of prevailing plain narrative text in the patient records was already identified in the Finnish e-health strategy documents in 1998. The electronic patient records project of the National Health Project Programme 2002–2007 worked on the common content and structure of the EPRs. The first 'core data' were defined in cooperation with different interest groups (The Finnish HL7 Association, professionals, administration, software enterprises) (Häyrinen et al. 2004, Hartikainen et al. 2009). The National Code Server was built in 2003–2004. It has been providing the main codes since 2004[1]. In 2007, by law, the task of maintaining the technical code server application was given to the National Social Insurance Institution (Kela) and the task of providing code services (codes and classifications and other contents of the code server) was given to STAKES (National Research and Development Centre for Welfare and Health, from 1 January 2009, the National Institute for Health and Welfare, THL). The legislation states that electronic patient records that are archived in the national electronic patient record archive and the patient summary have to use standardised data structures that are available via the National Code Server. More precise regulations on which structures have to be used in a standardised form by a certain time have been given as ministerial acts (Act 159/2007, Ministerial Act 298/2009 and 11.4. 2012/165, 13.10. 2015/1257). The first core data set was finally adopted into large scale use in 2014 and there is an

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[1] www.thl.fi/koodistopalvelu

implementation roadmap for more structures in the coming years up to the end of 2019. The regulations still leaves parts of the patient documents unstructured and new regulations to strengthen the structure are expected to follow later. In addition to the regulated codes, a large list of other codes has been given out from the code server for both regular use and piloting purposes. One important area of this work is structured nursing data. However, these structures will mainly not be a regulated part of the national EPR structures before 2020 (Ministerial Act 13.10. 2015/1257). The full implementation of the structured national electronic patient records will take around 15 years from the first legislation, but some local systems are quicker adapters and early users of unregulated structured sets.

THL plays a strong role as an authority giving binding orders on the structures of national electronic patient records and national coding systems; no such authority has existed before 2011 in Finland. The most important stakeholders are the users of the e-health and e-welfare solutions in the hospital districts, healthcare centres, social services and among private care providers. The organisations have been asked in the past e-health benchmarking surveys (Winblad et al. 2012, Reponen et al. 2015) how their experts had participated in defining the structures of the national electronic patient records. The response options were 1) participation in expert groups, 2) participation in expert work in virtual group work, 3) participation in workshops, 4) participation by replying to communications and 5) contacting authorities. The same questions were used in the national e-health benchmarking survey of 2017 (see Chapter 2 for methodology). The results and trends show that specialised care experts from hospital districts have all this time been the most active participants (Figure 1.3). All hospital districts had either participated in workshops or had given written communications and around 90% of hospital districts had experts who participated in national working groups that defined national EPR structures. Primary healthcare organisations have been somewhat less active. However, the activity has increased during the years of follow up. Most popular was participation in working groups (70%) and workshops (60%). Private sector experts seem to have most difficulties in finding time for the work in national networks and no increase in the activity during the follow up years can be seen (Reponen et al. 2018).

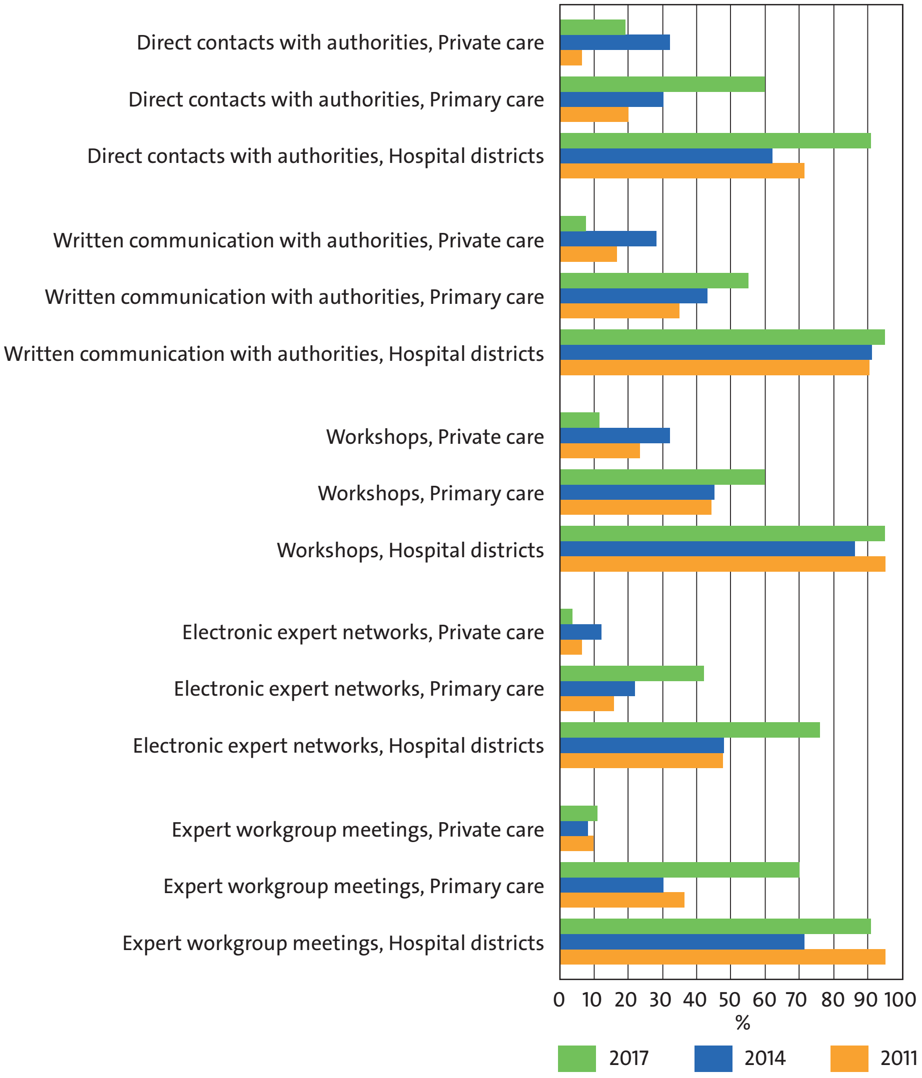

Figure 1.3. Hospital districts, primary healthcare organisations and private care providers that participated in defining national information structures in 2011, 2014, and 2017.

ICT for social care

An e-welfare programme was launched in 2003 as part of the national information society programme (Finnish Government 2003) in order to develop ICT for social services (Sahala 2005). A National Project of ICT in Social Services (named Tikesos) was implemented by the Finnish Association of Municipalities, THL, the East Finland Social and Welfare Centre of Expertise and the University of Eastern Finland between 2005–2011. The aim of the national development project was to promote the utilisation and interoperability of ICT in social services. The conceptual bases for interoperability were created (Sahala et al. 2011, Rötsä et al. 2016). Since 2012 the national development of ICT in social welfare has been organised by THL. The work has been based on the conceptual foundation that was created in the Tikesos-project. Many sets of defined code structures are available from the National Code Server. The first legislation on social welfare client documentation on the local and regional level came into effect in 2015 (Act 254/2015). The first legislative reforms enabling the implementation of such systems as e-welfare solutions were passed in 2015 (Act 255/2015) and more legislation was offered for Parliament's approval in 2018 but did not have enough time to be approved before the end of the term in April 2019.

A national social welfare client information repository and other national e-welfare ICT services are under preparation. The first 11 000 social service client documents have been archived in the national data repository in 2018 (Jormanainen 2018). The social services clients would get access to their documents after the legislation has been passed. The very first documents would not be structured. The level of structured elements would increase gradually. The implementation of structured nationally sharable e-Welfare documents is expected to take over 10 years from the first pieces of legislation. The current situation of the digitalisation of social service client documentation is presented in Chapter 3 of this book.

Electronic prescribing

Finland carried out the first national electronic prescribing (e-prescribing) pilot programme during 2002–2006 (Hyppönen et al. 2006). The development of the permanent e-prescribing system began from the lessons learned in the pilot. Legislation on the use of electronic prescriptions also came into effect in 2007 (Act 61/2007). The legislation made it mandatory to join the national e-prescription system for all except solo-practice physicians, but later it became mandatory also to them. Most physicians use EPR applications and prescriptions that are produced electronically within the EPR. A web based direct access (Kelain application) is also available. The e-prescriptions are sent from the physician's surgery to the national e-prescription repository. All the pharmacies are connected to the repository and are able to access the prescription for purposes of dispensing. The national prescription centre is hosted by Kela. Finnish e-prescribing is fully integrated with the different EPRs and the centralised Pharmaceutical Database; this ensures that the system contains continuously updated knowledge about all drugs prescribed to patients, using highly secured networks (Reponen et al. 2008). The architecture of the system can be seen in figure 1.2.

By the end of 2012 all the pharmacies had to, by law, join in to the service. The deadline for the public health service providers was by 2013. Private healthcare providers were due to subscribe e-prescribing system in two phases: providers prescribing more than 5,000 prescriptions annually were due to subscribe e-prescribing system by the 31st March 2014 whereas the rest by 31st December 2016. All pharmacies, public healthcare providers and 1,268 private healthcare providers had subscribed e-prescribing services by 31st December 2017 (Act 61/2007, Jormanainen 2018).

Nowadays all prescriptions are issued and dispensed electronically via the Kanta services. Prescriptions on paper or via telephone are an exception and the reason has to be recorded in to the system for evaluation. In those cases the prescriptions are recorded to the Kanta e-prescribing system at community pharmacies during the dispension phase. In 2017, altogether 31.91 million new e-prescriptions were recorded, out of which 31.19 million (97.74%) were from EHRs and 0.32 million (1.01%) from Kelain. Community pharmacies recorded 0.26 million (0.82%) paper and 0.13 million (0.42%) telephone prescriptions to the e-prescribing system. All together 133.56 million e-prescriptions have been recorded in the Kanta e-prescribing system between 2010–2017. The full implementation of the Finnish national electronic prescription system from the legislation to full deployment took 10 years (Act 61/2007, Jormanainen 2018).

Sharing patient documentation in the Kanta services

The national architecture consists of local EPRs using common data structures and technical standards, the national patient data repository in which all EPRs and patient summaries are made available online following patients' consent. Data between the central organisations and healthcare providers are transferred over the Internet via a VPN (virtual private network) or SSL (secure socket layer) -secured connection. Joining the national digital repository for electronic patient documents, Kanta services (Figure 1.2), is mandatory for all public healthcare providers. The types of documents to be archived are stated in a ministerial Act; see the topic 'structured EPR.s earlier in this chapter. Private service providers using electronic documentation (Act 159/2007) also have to join the Kanta services.

The first public healthcare providers joined the Kanta national electronic patient record repository in 2013. All public healthcare providers had joined in by end of 2015. In addition, 363 private healthcare providers have joined by the end of 2017. It has been possible to archive oral healthcare records in the Kanta patient data repository since May 2017. There were electronic patient documents of 5,770,000 persons in the repository by the end of 2017 (Jormanainen 2018). There were 1,345,164,021 documents in the repository on the 30th November 2018 (Social Insurance Institution of Finland (Kela) 2018b).

Citizen centeredness and electronic services to citizens

The very first Finnish national strategy for applying information technology to healthcare and welfare was already built around the principle of citizen-centred and seamless service structures. During the first 10 years of strategy implementation, the idea survived, but in practice it was not much implemented (Hämäläinen and Hyppönen 2006). Some local projects were launched (Winblad et al. 2008, Hyppönen et al. 2010) but the first national e-health service to citizens has been 'My Kanta Pages' in the national Kanta services. When Kanta services opened during 2010, all adult citizens were given access to one's own EPR-data, prescriptions-data, log information and consent management service. Later prescription renewal has been added. My Kanta Pages can be used by a person who has a Finnish personal identity code. To access My Kanta Pages, a person must select an identification method out of three possibilities: identification using online banking codes, or mobile identification, or certificate card (electronic ID card). In total 2,369,521 persons, 53% of adults, had used My Kanta Pages by the end of 2017. Out of the users 90,000 persons have denied full or partial sharing of their patient records via the Kanta service by the end of November 2018 (Social Insurance Institution of Finland (Kela) 2018b). My Kanta Pages had been used 16.4 million times by the end of 2017 (Jormanainen 2018). During the year 2018 the monthy number of users has been around 600,000 persons (Social Insurance Institution of Finland (Kela) 2018b). Citizen experiences on My Kanta services are described in chapter six of this report.

Also other projects to promote citizen centred approach to healthcare digitalisation have been launched. A personal health record (Kanta PHR) has been developed in to the My Kanta Pages. With My Kanta Pages Personal Health Record (Kanta PHR) one can monitor wellbeing and save health data in the service. The Kanta PHR is used with a wellbeing application (a mobile device such as a smartphone or a tablet, or a program or service used in a computer approved by the Kanta services. In the future, data in Kanta PHR can also be utilized by healthcare professionals in support of one's care if one gives consent to it (Jormanainen 2018). This service is new and the amount of users is still small.

The five Finnish university hospital districts have launched a Virtual hospital project that has been fiscally supported by the Ministry of Social Affairs and Health. The project has built several e-health services to support citizens and professionals. There is an IT platform with three levels of services under the brand Health Village (Terveyskylä.fi): 1) for all citizens, 2) patients, and 3) professionals. The services have been built by 1,500 health care, IT, data and communications professionals from the university hospitals together with patients. So far 80 digital care paths for different patient groups are being built, over 20 are already in use. There are symptom navigators (certified medical devices), chatbots, self-care paths, remote services etc. There are about 400,000 visits to the open websites every month, and the amount is increasing (Virtuaalisairaala 2019).

Major cities in Finland have been working for self-service portals connected to their healthcare systems. One of the pioneers was the Oulu self-care project (Winblad et at. 2008, Hyppönen et al. 2010). Currently the flagship of primary healthcare self-care service development in major cities, and supported by the Ministry of Social Affairs and Health, is the ODA project for self-treatment and digital value services (City of Helsinki 2016). The ODA project aims to build a personal healthcare clinic at home in order to acquire and implement digital, device-independent service package including electronic well-being check-up and training, smart diagnosis, estimates about need for services, and electronic well-being plan. The ODA service package will be integrated with the national Kanta services, electronic patient records and other electronic services (e.g. appointment, laboratory test results). In addition, the ODA service package enables the utilization of data collected and entered by the client himself/herself. Smart combination of data from different sources provides fluent, automated self-care service chains and guides the user to receive timely services. The project is a continuation of already existing self-care and appointment services, bringing more intelligence into those services (Kouri et al. 2018). Both the ODA project and the Virtual Hospital project collaborate in order to build a seamless service interface to citizens.

The current governance structure of the national e-health and e-welfare infrastructure

At the strategic level, steering of the national e-health and e-welfare infrastructure, including the Kanta services, falls under the responsibility of the Ministry of Social Affairs and Health. The Ministry is supported by the Advisory Board for Electronic Information Management in Social and Health Care. Operational steering and co-ordination has been the responsibility of the National Institute for Health and Welfare (THL) since 2011. The task of THL includes planning, guidance, steering and follow-up of the development of the Finnish e-health system. For this work THL founded a specific unit, the Unit for the Operational Management of Health and Welfare Information (OPER) in 2011 (Hyppönen et al. 2011).

The coordinating function at THL has close working relationships and cooperation with several national actors as well as health and social care service providers, pharmacies and system suppliers. The coordinating function works closely with Kela Kanta services – that run the integrated services – in development teams, groups and steering boards for operative decision making to construct infrastructure, develop services and carry out joint efforts to support citizens, service subscribers and system suppliers. The coordinating function has also granted state subsidies to provide partial funding for breakthrough pilots (Jormanainen 2018).

There are many important stakeholders in the development of the national e-health and e-welfare infrastructure. The Association of Regional and Local Governments has an important role in supporting the implementation of the national health and social care information systems. The association has launched forums to support the development of e-health and e-welfare at the local and regional level and is maintaining an ongoing innovative discussion on practical questions between care organisers, providers and the State authorities (Kuntaliitto, 2019).

The Ministry of Finance also has a role in the governance of health and social care ICT. The Act on Information Management Governance in Public Administration (634/2011) came into force on 9th June 2011. It is an enterprise architecture approach that enforces and promotes interoperability, standards, descriptions and definitions and utilisation of common data. The aim of the legislation is to reinforce interoperability of products that are used in all public services including public healthcare.

Each ministry steers the development of information management and related projects in its own administrative branch. However, the Ministry of Finance steers general public sector information management, structural development, and joint services and service provision. It also steers the general criteria for information security, prepares information and administrative policies and develops digital administration. The Public Sector ICT Department at the Ministry of Finance provides preconditions for the digitalisation of the public sector and sets a strong example. This is done by digitalising public sector services, promoting interoperability across administration and enabling the security of authorities' activities. The ministry prepares general ICT policy issues. For example, on 5 December 2018, the government report 'Ethical information policy in an age of artificial intelligence' was adopted by the Government. The report is intended to mark the start of a new cross-government policy sector, information policy. Information policy is described as policy measures for promoting the good management and effective utilisation of information (Ministry of Finance 2019).

Finland and international e-health developments

Finland is an active member of the European Union e-health Network under the directive for cross boarder services. The country has participated and participates in several European e-health projects such as Expand and JAseHN. In the epSOS project Finland piloted, together with Sweden, the cross-border e-prescription. Finland is participating in a Connecting Europe Facility (CEF) project and has built the cross-border e-prescription infrastructure, where the first e-prescription service has been taken into use between Finland and Estonia in January 2019 (Ministry of Social Affairs and Health et al 2019). Finnish patients are now the first EU citizens that can use their e-Prescriptions in another country (European Commission 2019) Finland participates also in OECD's work on e-health benchmarking and information infrastructure guidance. Together with other Nordic countries Finland is active in the Ministerial Working Group on e-health under the Nordic Council of Ministers. A Nordic research group (NeRN) is working on common Nordic e-health indicators under the umbrella of the Nordic Council of Ministers. More details on international collaboration in various benchmarking activities are written below.

Nordic e-health benchmarking

The Nordic countries have progressed far in development and implementation of national health information systems. The differences in e-health policies, architectures, and implementation create a fruitful basis for benchmarking and learning from each other.

The Nordic Council of Ministers set up a Nordic e-health group to bring e-health higher on the Nordic agenda in 2012. One priority for the group during period 2012–2015 has been to benchmark the deployment and use of health IT within the Nordic countries. The e-health group established the Research Network to develop, test and assess a common set of indicators for monitoring e-health in the Nordic countries, Greenland, the Faroe Island and Åland, for use by national and international policy makers and scientific communities to support development of Nordic welfare.

The Research Network published its first report in 2013, where a methodology was presented to generate e-health indicators, and the first common indicators were tested (Hyppönen et al. 2013). The second report presented the benchmarking results of altogether 49 common Nordic health IT indicators, of which for 48 there were data available at least from some Nordic countries (Hyppönen et al. 2015). The current work presents a solid basis for continuing work towards the ultimate goal: generating e-health benchmarking data for supporting development of Nordic welfare (Hyppönen et al. 2017). The further work aims at developing key indicators for e-health outcomes and citizen experiences as well as provision of an intelligent electronic publication system of the e-health monitoring data.

OECD-level benchmarking

The OECD has led an effort to provide countries with reliable statistics to compare ICT development and policies in the health sector (Adler-Milstein et al. 2013), to assist governments in understanding the barriers and incentives to ICT use and to realize the far-reaching economic and social benefits from their application.

The OECD and its partners developed a model survey in 2012 and 2013 to support the collection of internationally comparable measures on the use of ICTs in the health sector. It covers four focus areas: electronic health records, health information exchange, personal health records, and tele-health. Since then, a number of countries in the OECD and beyond have begun piloting the model survey and/or mapping information from existing surveys and administrative data sources to indicators derived from the model survey.

In Finland, the pilot and further implementation effort is led by National Institute for Health and Welfare (THL). The OECD model survey implementation occurred by mapping the information from existing surveys and administrative data sources to the model survey indicators, and where possible, altering or adding questions to comply with the model survey. The piloting of the OECD Guide to Measuring ICTs in the Health Sector was integrated in two national surveys – the healthcare organisation survey (mapping availability and use of ICTs) and the survey of doctors (including some availability measures, focusing mainly on user experience of ICTs), two of the surveys of this report.

Finland continues the follow up of the national e-health development and impacts via regular national surveys and log and register data analysis. Since 2017 Finland has included all the OECD model surveys questions that are feasible for national /international benchmarking of the Finnish situation. Finland is also open to piloting possible new modules to the OECD survey within the national survey/ data collection scheme.

European e-health benchmarking

The European Commission has funded several studies on benchmarking e-health. The e-health usage in European acute care hospitals was surveyed in 2011 and in 2013 using the same indicators but having a different sample in various countries. However, the results could estimate development trends. Finland had at the time the year 2013 study fully implemented electronic prescription and was among the best performers, the order being Denmark, Estonia, Sweden and Finland. Finland was above the European average in all the 13 used e-health implementation indicators. Most successful implementations have been in the use of fast broadband connections, electronic prescription and electronic referral system with EPR integration (Joint Research Centre of the European Commission 2013a, 2013b, 2013c, 2013d, 2014).

The status survey of e-health availability and use among general practitioners was performed first in 2007 and repeated five years later in the study "Benchmarking deployment of eHealth among General Practitioners II". In this survey conducted in 31 countries (EU27+ Croatia, Iceland, Norway, and Turkey) a random sample of 9,196 GPs was interviewed and data was processed using sophisticate multivariate statistical techniques. The study calculated an overall composite index of e-health adoption using equal weights for the selected main composite indicators (EHR, health information exchange (HIE), Telehealth, and PHR). The six leading European countries in e-health adoption based on this overall index were Denmark, Spain, Norway, Estonia, The Netherlands and Finland. In those four main composite indicators, Finland was 8th in the adoption of EHR, 4th in the adoption of HIE, second in the adoption of telehealth consultations and 14th in the adoption of PHR. Interestingly, Finland scored highest in the indicator which measured the availability and use of radiology test reports and images among general practitioners (Codagnone and Lupiañez-Villanueva 2013).

In addition to EU benchmarking studies, Finnish e-health developments have been evaluated in a peer review conducted by European Health Telematics Association (EHTEL). The Ministry of Social Affairs and Health of Finland requested this expert panel review as a preparation for a new e-health and e-welfare strategy. The peers were senior e-health experts from a range of European, and nearby, countries. The analysis highlighted the main opportunities for progressing Finland's health and social care domains through a well-conceived e-health deployment. One finding in the report was that in Finland there is a long track of e-health development and nowadays almost all records are "electronic from birth". This means that the country has direct access to a source of either valuable information or resources, making secondary use of data from routine healthcare feasible (EHTELconnect, 2013).

Activities supporting the implementation of e-health and e-welfare by research and educational institutes and professional organisations

Funding for research and development in health informatics originates primarily from the public sector. Much of the development is funded by the municipalities and private service providers themselves. External funding is provided nationally by the Ministry of Social Affairs and Health, The Ministry of Finance, the Academy of Finland (a science academy), the Finnish National Fund for Research and Development (SITRA) and the semi-public sector (such as the Business Finland, earlier called National Technology Agency – TEKES). Resources are also provided by European Union projects or structural funds (Hyppönen et al. 2011). The allocated funds are primarily targeted at pilot projects, innovation and the promotion of e-health applications, as well as at the further standardisation of existing tools.

The Act on electronic social and healthcare client and patient information (Act 159/2007, 20 §) stipulates that THL is responsible for steering and monitoring of electronic handling and data management of social and health care data. THL is a research organisation of the Finnish State. It undertakes and co-ordinates research work in the area of e-health and e-welfare with a focus on national e-health and e-welfare monitoring and benchmark related to the impacts of the implementation of legislation and national policies to support the steering of e-health and e-welfare services. National monitoring and benchmarking surveys have been conducted in collaboration of the Ministry, universities (University of Oulu, University of Eastern Finland, Aalto University) and professional associations (Finnish Medical Association, Finnish Nurses Association) since 2003 in individual projects. In 2014 the projects were for the first time coordinated under one umbrella project, STePS. In 2014, there were 4 surveys under the umbrella: organisational survey of availability and use of e-health, organisational survey of availability and use of e-welfare, physician experiences of e-health and citizen experiences on e-health. In 2017 data collection round (STePS 2.0), national survey of nurses' experiences was added to the survey palette.

The national surveys have been timed to measure baseline situation or advances of key policy objectives at certain intervals. The report at hand collates the key results of the 2017 data collection round and key changes from 2010 and 2014. Chapter 2 depicts results of the latest health care organisations' survey, Chapter 3 the corresponding survey to social care organisations. Chapter 4 includes results of the survey to physicians, and chapter 5 results of the corresponding survey to nurses. Chapter 6 collates results of the survey to the citizen. Chapter 7 describes the database opportunities to assess the national e-health and e-welfare Strategy goals, and Chapter 8 presents main findings and key conclusions of the surveys and future prospects.

In addition to the national monitoring, research on various aspects of health informatics related to medical imaging and bio-signal processing and analysis including artificial intelligence is performed at the Aalto University in Helsinki, the Tampere University, the University of Oulu and the University of Eastern Finland. In addition, a health informatics laboratory operates as part of the VTT Technical

Research Centre of Finland (VTT). Considerable research work at international level is undertaken in the fields of bioinformatics and genomics in various universities. However, a direct connection of that work to health informatics research is still under development.

Research groups in several Finnish universities cover e-health and e-welfare issues. The University of Eastern Finland has an active Healthcare Information Systems Research and Development Unit. Its activities focus on areas such as electronic health records, personal health information management, enterprise architectures and enterprise modelling, health IT standards, health informatics capacity development, medication management and large-scale public sector ICT initiatives (University of Eastern Finland 2019a). The University of Eastern Finland also has a Department of Health and Social Management. Its research focuses on the study of health and social care effectiveness, evaluation, integration of health and social care services, management of health and social care services and health and human service informatics issues (University of Eastern Finland 2019b). The academic publications have addressed e.g. the definition of the contents and structures of electronic patient files, evaluation and introduction of information systems, modelling of informatics in the healthcare sector, information security issues and studies addressing the skills of information system users.

FinnTelemedicum at the University of Oulu is a research group for medical ICT applications belonging to the Research Unit of Medical Imaging, Physics and Technology, MIPT (University of Oulu 2015). Its main research areas are the assessment of new digital health models as well as the evaluation of e-health applications and health information systems. Its applied research focuses on the clinical impact and usability aspects of health information systems as well as on the possibilities of artificial intelligence in healthcare. The University of Oulu was first in Finland to establish a professorship of health information systems for the Faculty of Medicine in 2013 in order to support research and education in this field. The Faculty of Medicine in Oulu has also established in 2018 a DigiHealth Knowledge Hub which will support research and innovation collaboration with enterprises with its experts in digital health solutions assessment, data analytics and data practices, and artificial intelligence exploitation (University of Oulu 2018a).

The Tampere University has an Institute of Biosciences and Medical Technology, BioMediTec, a cross-scientific research and educational institute that serves as a platform for innovations, technology transfer and industrial collaboration in area of health and life sciences. The institute constitutes several top level research facilities and has brought together technological and bioscientific research in an innovative way (Tampere University 2019a). In addition, the faculties of Information Technology and Communication Sciences and Medicine and Health Technology have a research groups focusing on Medical Informatics research (Tampere University 2019b). Operating under the Tampere University is a research institution called the Tampere Research Centre for Information and Media (TRIM), which has also researched social informatics (Tampere University (2017).

The Turku University Unit of Information Systems Sciences has focus on the assessment and evaluation of health information systems, with a specific focus on business processes, revenue models and cost-benefit assessment (University of Turku 2019).

Aalto University, Department of Computer Science and Engineering, also applies research in the field of usability of healthcare IT systems, as well as in user-centred healthcare service design (Kaipio 2011).

Studies in health and human services informatics have been offered in the University of Eastern Finland since 2000 as a Master's degree programme. The emphasis has been on training professionals in health and social sector to acquire the necessary skills in ICT development, implementation and management. It was the first master's degree programme in the world to be certified by the International Medical Informatics Association. (University of Eastern Finland 2019c)

In 2017 Savonia University of Applied Sciences launched a new master education, Master's Degree Programme in Digital Health (90 ECTS credits) which is offered online. The programme provides the graduates with skills needed for innovative development of advanced social and healthcare services, service production, expert organisation management and for the development of digital service quality and management. The programme is available to healthcare staff, engineers and business and administration personnel working near e-health field (Kouri et al. 2018).

For detailed studies of practical implementation of e-health and telemedicine, the University in Oulu has since 2006 organised a web-course in a specific virtual learning environment on the theme of 'Basics in e-health'. This course is provided in English and welcomes foreign exchange students as well as local degree students. The main learning objectives of this course are that the student can define the core ICT solutions in healthcare, and can understand the position of e-health and tele-medicine solutions as a part of the national healthcare information systems (University of Oulu 2019). In 2018, this course was accompanied with a hybrid course 'Connected health and m-Health' which combines web-based virtual learning and hands on innovation workshops with enterprises (University of Oulu 2018b). Both courses are multiprofessional and the participants are from different backgrounds, e.g. from medical technology, biomedical engineering, biophysics, physics, also students of medicine, health sciences and information technology

At the University of Lapland, the Faculty of Social Sciences has in 2011–2015 organised a Master's degree programme in e-competence in Social Work (SIMO III) as a project (Kilpeläinen and Päykkönen 2014), which combined the disciplines of social work and applied information technology. Students of the programme obtained dual competence: both in social work and in how to use IT in social work.

There are two main professional organisations active in the field of health informatics in Finland. The Finnish Society for Telemedicine and e-health (FSTeH)[2] is a national member of the International Society for Telemedicine and e-health (ISfTeH) and the Nordic Telemedicine Association. The Finnish Social and Healthcare

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[2] http://www.telemedicine.fi/en

Informatics Association (FinnSHIA) [3] is a national member society of the International Medical Informatics Association (IMIA) and the European Federation for Medical Informatics (EFMI). Those Finnish associations publish together the Finnish Journal of e-health and e-welfare[4]. The Association of Finnish Local and Regional Authorities [5] also have an active role in networking between Finnish health and social care providers around e-health and e-welfare questions. For more than two decades, all these three associations have organised annual national conferences and special topic sessions in the field of health and social care informatics. These conferences are an important source of continuous education to the personnel in the health and social care sector.

Finnish Medical Association together with Finnish Dental Association and FSTeH has since 2013 established a special competence for healthcare information technology for Finnish physicians and since 2015 for dentists as well (Reponen et al. 2013, Reponen 2017). It is a special competence that a medical specialist can achieve on top of his medical specialisation and clinical experience. It brings a competence in, for example, supervising health ICT architecture design from a user perspective, participating in e-health development, or establishing new digital health services. By the end of 2018, 72 physicians and 13 dentists have achieved this special competence.

University of Oulu was first in Finland to organize e-health teaching to the curriculum of undergraduate medical students. Since 2016 all fifth year medical students have participated a mandatory special thematic e-health day, where they were taught examples of best practices by national top e-health experts Then they have a learning exhibition where a range of major ICT companies and start-up enterprises display their novel innovations in the Oulu University Hospital Testlab environment. Finally the students evaluate the expected feasibility of those solutions for real life working situations (Honkanen 2017).

MEDigi is a Finnish national project that aims for digitalisation and harmonisation of teaching in medical fields. MEDigi is one of the higher education development projects financed by the Finnish Ministry of Education and Culture in 2018–2021 (Ministry of Education and Culture 2018). The project aims to create a national on-line environment for digital learning materials, produce and pilot learning materials as well as develop electronic exam and assessment methods. In order to fullfil the goals, MEDigi will improve the digital skills of teachers, too. Moreover, MEDigi will support future physicians and dentists in their professional environment by creating competence in the use of e-health and m-health tools. MEDigi is a joint project between all of Finland's medical faculties and is coordinated by the University of Oulu. More information is available at www.medigi.fi (Reponen 2019).

The Finnish Nurses Association has launched the standards for special competences of nursing informatics specialty certificate. The certification may be admitted to a registered nurse working in nursing informatics (including e-health)

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[3] http://stty.org/in-english
[4] http://www.finjehew.fi
[5] http://www.localfinland.fi

and demonstrating the required merits via an electronic portfolio in three categories: work experience, formal education and cooperation and developmental activities relating to nursing informatics specialty (Liljamo et al. 2017, Kouri et al. 2018).

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2 Availability and use of e-health in Finland

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The Ministry of Social Affairs and Health in Finland has regularly instructed and followed the implementation of ICT and e-health development in healthcare and this work has resulted in a series of surveys. The first comprehensive survey on the availability and use of e-health was conducted at the situation prevailing right before the onset of the National Project for Securing the Future of Health Care (Kiviaho et al. 2004a, 2004b). That was followed by surveys in 2005 at the situation halfway through the National project (Winblad et al. 2006), in 2007 (Winblad et al. 2008) at the end of the National project, and in 2011 (Winblad et al. 2012) describing the situation at the launching stage of the national health information exchange (HIE) services 'Kanta'[6], In 2014 the survey time point was when e-prescription services had been nationally adopted in public healthcare and first institutions had started to use the Patient Data Repository (Reponen et al. 2015a, 2015b). The current sixth survey in 2017 (Reponen et al. 2018) was at the point when electronic prescribing was in use in all public and private healthcare organisations and the Patient Data Repository was in use in public healthcare and at the launching state for private sector.

Questions have been kept as comparable as possible to the questions of the previous surveys, but in order to follow the development of ICT in healthcare and to achieve compatibility with the new indicators based on the OECD (OECD 2015) and the Nordic e-health Research Network (NeRN) (Hyppönen et al. 2013a, 2013b, 2015, 2017) indicator development, some modifications were made to the 2017 survey.

2.1 Data collection and comparison to earlier surveys 2003–2015

This survey was conducted as described in the reports of previous national e-health surveys of Finland (Hämäläinen et al. 2009, 2013, Reponen et al. 2015b). A structured web-based questionnaire was distributed by e-mail to all public healthcare service provider organisations, which are municipal healthcare centres for primary healthcare and hospital districts for specialised secondary health care, and to a sample of private healthcare provider organisations. Hospital districts described particularly the situation of their central hospitals. The questionnaire (English translation) is available in electronic format in the STePS project's website (thl.fi/stepsproject).

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[6] http://www.kanta.fi/en/ (3.8.2018)

In addition to availability, the intensity of use of the main systems was also inquired about. The intensity revealed the amount (%) of an action or function that was carried out by electronic means. The questions for hospitals, healthcare centres and private healthcare providers differed to some extent, depending on the nature of the services they provided.

The questionnaire was sent in March 2017 to all public service providers, including 21 hospital districts and 141 healthcare centres. It was targeted to IT leaders (CIOs) in hospitals and municipalities, parallel to medical directors and chief physicians. The questionnaire was also sent to a sample of 46 private medical care service providers. It was targeted to the chief executive officers (CEOs) or medical directors of nationally biggest (by the sales volumes) private healthcare providers and supplemented with units that had taken part in the survey in 2014. All organisations were asked to give their answers based on the situation on 31st of January 2017.

The results in this section are mainly presented as a percentage of organisations having the functionality of interest (availability) and as the organisation's estimate of the intensity of use of those functionalities. For public healthcare, availability is presented as a percentage of those organisations that have answered the questionnaire, hospital districts n=21 and healthcare centres n=121. The results for the private sector organisations are mainly presented as the number of organisations having the functionality of interest. A full report in Finnish with a detailed description of the method and all the findings of the survey was published in 2018 (Reponen et al. 2018). Data for the years from 2005 – 2014 are based on previous reports (Kiviaho et al. 2004a, 2004b, Winblad et al. 2006, 2008, 2012, Reponen et al. 2015a) if not otherwise stated.

Response rates to the questionnaire in public healthcare were 100% (21) for hospital districts and 86% (121/141) for healthcare centres. The latter figure covers 95% of the Finnish population at primary healthcare level and includes primary healthcare organisations from each of the hospital districts. The response rate is comparable with the previous surveys from 2011 (Winblad et al. 2012) and 2014 (Reponen et al. 2015a). The data obtained from public healthcare organisations can be considered as representative and exceptionally comprehensive, which makes comparison with the previous reports feasible.

For private healthcare providers, the response rate was 57% (26/46). The size of the sample was not large, but nationally biggest private healthcare providers were included. Thus, the results concerning private providers can only be regarded as indicative. The results are moderately comparable with earlier results, since 61% of those organisations which responded in 2014 responded also in 2017.

2.2 Availability and use of Electronic Patient Records (EPRs) and auxiliary systems in Finland

2.2.1 The Development of the structured EPR

In the 1980s the Association of Local and Regional Authorities designed a set of paper-based health records that became widely used for primary healthcare and specialised care. First comprehensive EPR was taken into clinical use in Varkaus primary healthcare centre in 1980 (Hosia 1984). In the major hospitals, the implementation of EPR was a different, gradual process (Alanko et al. 1998). When healthcare providers started commonly adopting the EPR in the 1990s this resulted in different EPR designs in many organisations (Jormanainen et al. 2019). The need for structured data instead of narrative text in the patient records was already identified in the Finnish e-health strategy documents in 1998. The strategic development since 2002 towards current nationally standardized data structures has been described in the chapter 1 of this publication.

2.2.2 The availability and use of electronic patient records

The documentation of patient data in the Finnish healthcare system is nowadays carried out by electronic means. The transition from paper-based to electronic records took place in the late 1990s in healthcare centres and after the year 2000 in hospitals. The progression towards saturation point in the **availability** of the EPR can be assessed based on data from repeated surveys since 1999 (Hartikainen et al. 1999, 2002, Kiviaho et al. 2004b, Winblad et al. 2006, 2008, 2012, Hämäläinen et al. 2007, 2009, Reponen et al. 2015a).

In **public specialised healthcare hospitals,** the EPR for narrative texts and additional information has been available in all the 21 hospital districts since 2007. The progress since the mid-2000s has been very fast.

In **public primary healthcare centres** the availability of the EPR has already been over 90% since 2003 and the saturation point for EPR implementation with 100% availability was finally reached in 2010.

Among **private healthcare service providers,** all survey respondents in our samples have reported the EPR availability since 2005 suggesting that the deployment of the EPR has reached saturation point in private healthcare as well.

The EPR infrastructure is not uniform but the number of EPR trade names has decreased over the course of time. As in 2014, also in 2017 there were five different EPR trade names in public secondary healthcare and six different trade names in public primary healthcare. In our sample of private care providers, six different EPR trade names were in use.

As the saturation point for EPR availability was reached in all healthcare levels, new indicators were required. The **intensity** of use is an indicator that describes the amount of information that is utilised only in electronic form. This additional parameter also gives us information on the situation in the four main medical responsibility areas in hospitals.

In 2017, the full 100% intensity of use of EPR was reported in 91% of **hospital districts** in the responsibility area of conservative care. The same full usage intensity was reported by 86% of the districts in operative, 81% in psychiatric, and 71% in emergency care. Compared to earlier studies, further progress in already high intensity has been made (Figure 2.1). Emergency care has had slightly less electronic-only information use than other areas. In 2017, it was the only area where hospital districts reported intensity of use less than 50%, and that was the case in one organisation only. One possible explanation for the lower usage level of electronic-only information can be the fact that several different kinds of organisations are involved in emergency medical service missions, and all organisations have their own ICT systems (Haverinen et al. 2018).

In addition to main EPR system, applied systems for specific tasks in various specialities were widely used, especially in pathology, cardiology, and intensive care. The loaning of adaptive home care medical equipment (e.g. wheelchairs, crutches, walkers) to patients is included in the services of the healthcare providers. 91% of hospital districts and 37% of the healthcare centres maintained electronic registers of borrowed adaptive home care medical equipment.

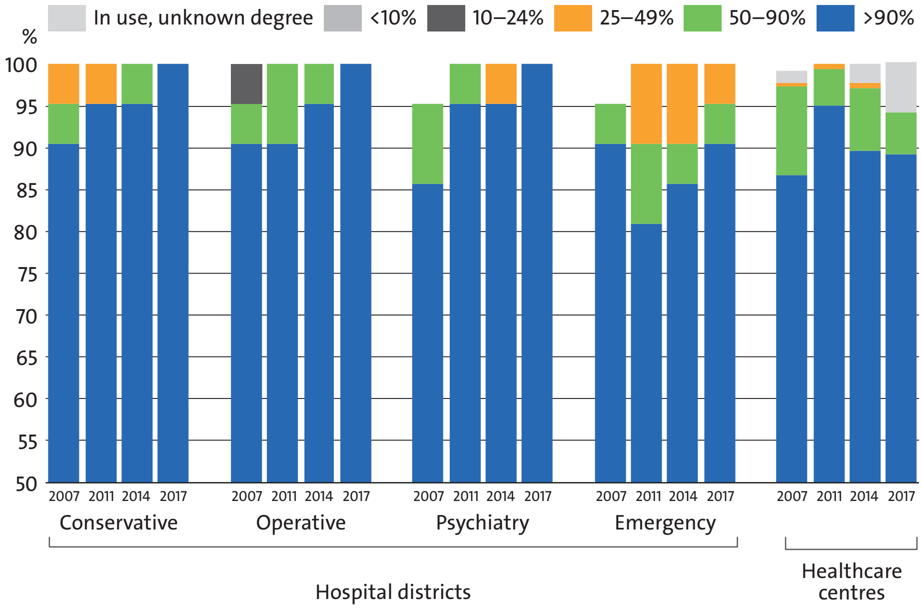

Figure 2.1. The distribution of public healthcare providers according to the intensity of EPR usage. Hospital districts shown separately for the responsibility areas of operative, conservative, psychiatric, and emergency care.

Due to the long history of electronic records and the lack of multiple responsibility areas, the intensity of use for electronic-only data was high in primary health care, which means that 92% of the responding healthcare centres reported that over 90% of patient data was processed electronically (Figure 2.1). In the present survey sample of **private service providers,** 81% reported that the intensity of use for EPR data was over 90%. This was at the same level as in 2014.

2.2.3 The usage of structured data-elements in EPRs and other patient information systems

The National Code Service maintains and distributes national code sets, classifications, terms and other datasets used in EPRs and social care client information systems. EPR products acquire the codes for their own use from the server. Access to the codes is free of charge.

The six most common healthcare classifications used in EPRs and acquired from the National Code Server are presented in Figures 2.2 and 2.3. The use of the major nomenclatures has remained high. Coded data required for joining the national Kanta services (e.g. ICPC-2 (International Classification of Primary Care – 2nd Edition) and Type of risk data codes) have rapidly increased the intensity of use. The most common codes, like ICD-10 (International Statistical Classification of Diseases and Related Health Problems), the nomenclature for radiological procedures, and the nomenclature for laboratory examinations are used in some form in all healthcare units, but they are not always or knowingly obtained directly from the National Code Server.

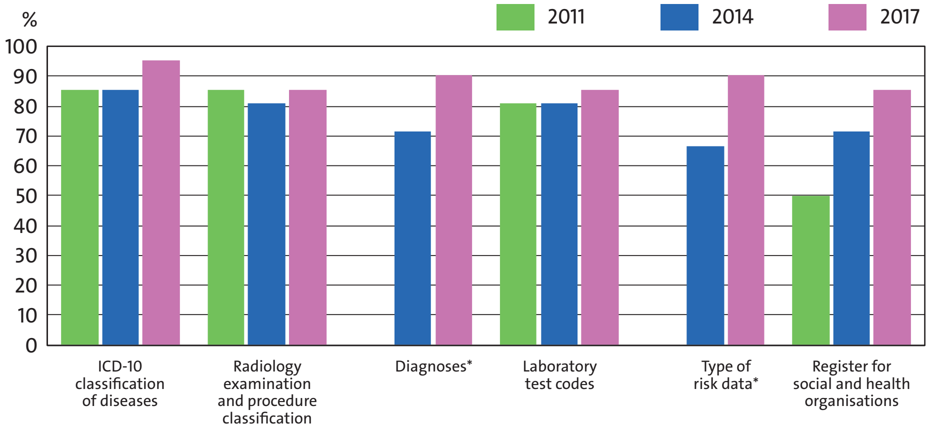

Figure 2.2. The codes and classifications most commonly used in Finnish public hospital districts. *Type of risk data and diagnoses were not asked in 2011.

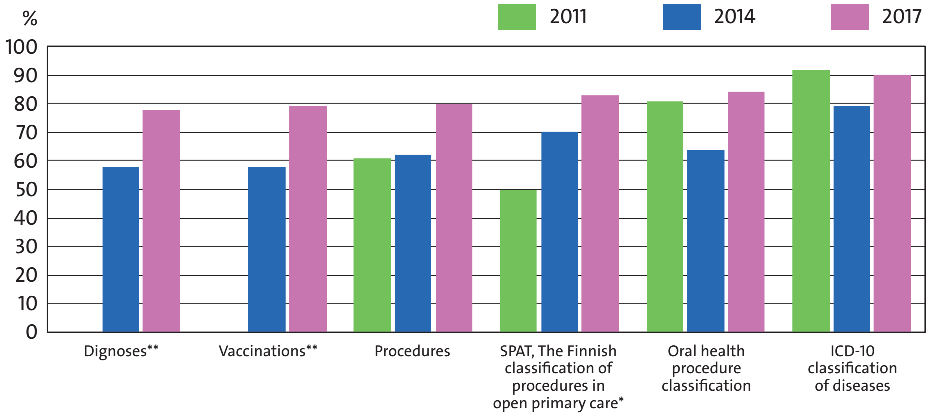

Figure 2.3. The codes and classifications most commonly used in Finnish public primary healthcare centres. *SPAT is estimated by the number of AvoHilmo users in 2011. **Diagnoses and vaccinations were not asked in 2011.

In 2017, 100% of the hospital districts and 92% of the healthcare centres reported that they used electronic nursing documentation. Documentation was part of the main EPR system in 95% and structured in 90% of hospital districts (85% in 2014). In healthcare centres, documentation was part of the main EPR system in 90% and structured in 88% of organisations (82% in 2014). Thus, there has been a modest increase in structured nursing documentation since 2014.

2.2.4 Picture archiving and communication systems

DICOM (Digital Imaging and Communication in Medicine) standard has been obeyed in Finland since its birth and the first filmless hospitals emerged around the year 2000 (Reponen 2004). The availability of Picture Archiving and Communication Systems (PACS) in Finnish **hospital districts** has been 100% already since year 2007. All hospital districts have also been reporting the high intensity of use of PACS, and in 2017 71% of hospital districts reported 100% intensity of use. None of the hospital districts reported any film imaging in the 2014 survey and in 2017 this was no further asked. There are seven different trade names in the Finnish hospital PACS market.

PACS was available in 98% of the **primary healthcare centres** (Figure 2.4). The saturation point of PACS availability has been clearly reached, as in 2014 and 2017 only maximum of two healthcare centres reported that they did not have PACS. Most of the healthcare centres (87%) utilised a common regional PACS with the hospital district and 8% had their own PACS. The availability of a regional PACS was at the same level compared to 2014 (90%), and the intensity of use was at the high level as it has been already in 2014. In 2017, 69% of the healthcare centres reported over 90% usage rate. Conventional film was still used in 7% of the healthcare centres that responded, mostly for dental x-rays. Five different trade names were reported for those PACS that were owned by the healthcare centres themselves.

In the sample of **private service providers,** 19 out of 26 had PACS available, same as in 2014. Over 90% intensity of use for PACS was reported by 15 private service providers. Five different PACS vendors were mentioned in the private sector.

The growth rate of PACS usage in Finland has followed the general adoption of the electronic patient record systems (EPR). The tight integration of images with narrative texts in the EPR – and not only with radiological information systems (RIS) – has been one of the key aims of the development.

2.2.5 Radiology and laboratory information systems

A **radiology information system (RIS)** is a software entity for controlling the functions of radiological units. A RIS includes referral letters and appointment orders; it manages patient visits, transfers workflows and patient data sent to the radiological equipment, keeps a record of stored examinations and files radiologists' reports; it also manages the data for the statistical reports.

A RIS was in use in all of the 21 **hospital districts** for all their radiological examinations. This 100% availability was already reached in the 2007 survey, and over 90% intensity of use in all hospital districts in 2011. Most of the hospital districts have already acquired a second-generation RIS in order to achieve seamless integration with EPR and regional services. There are five major RIS vendors in the Finnish specialised care market.

Among **healthcare centres** 98% of those that answered the survey reported that they had a RIS in use, while the figure was 90% in 2014 (Figure 2.4). The results show that most of the healthcare centres now used the RIS of their hospital districts (81% of the users). The medical imaging in Finland is now a regional service.

In **private health care,** 42% of the respondents reported they had a RIS available, as in 2014. In practice, majority of private organisations using PACS (73% of the sample) probably used RIS functionalities embedded in their systems, since it is a prerequisite for electronic archiving.

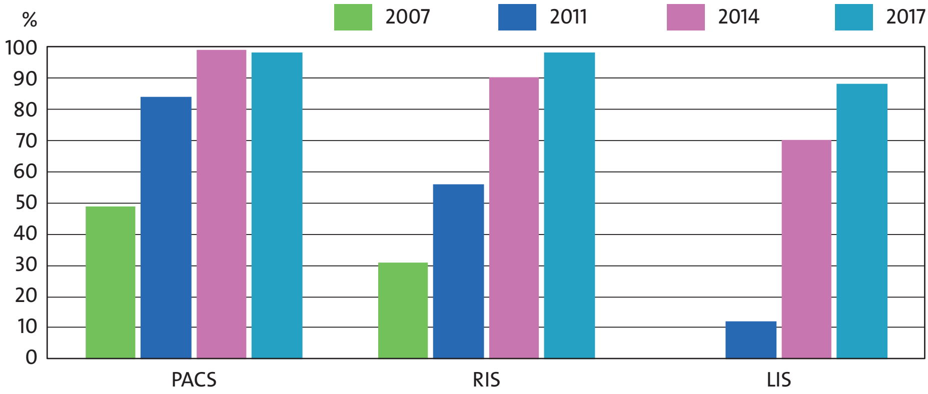

Figure 2.4. Availability of PACS, RIS and LIS in Finnish public primary healthcare centres.

A **laboratory information system (LIS)** is a software entity controlling the process of ordering laboratory tests electronically, identifying patients and controlling the equipment as well as sending the test results electronically to the ordering physicians. The systems also give guidance as well as statistical and performance information. Today, it is essential to link the systems seamlessly with the EPR.

All 21 **hospital districts** (100%) used a LIS, which was already the case in 2007. The transition towards regional laboratory service providers that cater more than just one hospital district seen already in 2014 had further developed in 2017. There were four different trade names for a LIS in the hospital sector.

In **primary healthcare centres,** 88% announced that they had a LIS in use, while the figure was 70% in 2014 (Figure 2.4). A LIS was provided by the hospital district in 43% of cases, by the regional laboratory service provider in 33% of cases and owned by the healthcare centres themselves in 21% of cases. In the private sector, a LIS was reported by 14 service providers while in 2014 there were 10.

2.2.6 Digital ECG

Digital electrocardiogram (ECG) is the most important biosignal data used in everyday medical practice. In 2017 100% of the hospital districts, 90% of the healthcare centres, and 42% of our sample of private providers had digital ECG in use. There has been a considerable increase in these figures since 2014, and a shift from proprietary or image formats to DICOM ECG (Table 2.1). The difficulty of transferring ECG data from emergency medical service units to hospitals was first discussed in a previous paper (Winblad et al. 2007). In this latest 2017 survey 91% of the hospital districts used electronic transmission between emergency medical service units and healthcare units. In over half of the hospital districts (57%) the standard used in this transmission was compatible with the hospital EPR system. All in all, there are still shortcomings in interoperability between institutions (Table 2.1).

Table 2.1. The availability of digital ECG and its data formats in hospital districts, healthcare centres and the private sector in 2011, 2014, and 2017.

		Digital ECG in use (%)	% of users use this standard		
			DICOM	Another or manufacturer's standard	PDF format
Hospital districts	2017	100	67	24	24
	2014	86	50	67	17
	2011	57	25	67	17
Healthcare centres	2017	90	44	20	21
	2014	77	38	45	10
	2011	62	26	68	15
Private providers*	2017	42	8	4	31
	2014	36	8	8	24
	2011	20	7	7	13
*a lot of missing data					

2.2.7 Wireless usage and speech recognition

The wireless use of the EPR refers to mobile documenting and browsing of patient information. All hospital districts had wireless access to the EPR within the institutions already in 2011. In 2017 a total of 91% of the hospital districts had extended wireless EPR access outside of the hospital e.g. for doctors on call (81% in 2014). Simultaneously, 91% of the hospital districts provided wireless access to medical imaging outside the hospital (90% in 2014). In 74% of the healthcare centres (42% in 2014), wireless EPR usage was available also outside of the unit. In our sample of private service providers, 10 out of 26 had wireless use of the EPR outside the institution. Thus, wireless EPR usage has increased compared to year 2014, especially in the primary health care. In 2017 the patient information contained in the EPR was available to the emergency medical service units in 57% of hospital districts.

The availability of **mobile terminal devices** has increased since 2014. In 2017, 76% of the hospital districts were providing a tablet computer to their physicians and 33% of the districts used them for EPR access. In healthcare centres, 21% were providing a tablet computer for physicians but only in 16 cases was EPR access possible. Among our sample of private service providers, a tablet computer was available for at least some of the physicians in 5 organisations and six organisations had possibility to use tablet computer for EPR access. Remote access to the EPR via a smartphone was reported in two healthcare centre organisations and in three private providers.

A speech recognition system for digitally dictated doctor's notes was in use in 81% of the hospital districts and in 30% of the healthcare centres while three years earlier the figures were 52% and 10%, respectively. In our sample of private service providers, six of them reported a speech recognition system, as it was the case also in 2014. The most often reported speciality using speech recognition in all sectors was radiology, but clearly the functionality is now being adapted also to other areas.

2.2.8 Systems supporting the quality and delivery of healthcare service

Decision support systems

Clinical decision support (CDS) systems are information- or knowledge-based systems that support the decision-making process. The Finnish EPR systems have long included functions that warn about pathological laboratory results. In addition, more and more hospital districts and healthcare centres use EPR systems that include reminders that inform about drug interactions or whether a patient had been prepared properly for laboratory tests or radiological examinations. EPR terminals also provide access to local, regional and national databases and guidelines with search engines. These databases can also be accessed with mobile devices.

In the 2017 survey, CDS systems were evaluated in three main categories, with examples of typical local systems to help in responding:

1) Diagnosis support systems (e.g. warnings about pathological laboratory results, or the Finnish systems Terveysportti[7] or EBMeDS[8]),
2) Drug interaction systems (e.g. the Finnish system SFINX (Swedish-Finnish-Interaction-X-referencing)/INXBASE[9]), and
3) Care pathway support systems (e.g. regional and national databases and guidelines, reminders about lab results or referrals).

The availability of CDS systems was evaluated at different integration levels:

1) A standalone online database on the same desktop as the EPR (e.g. links to an external database on the computer desktop),
2) An online database with access by navigating from the EPR,
3) A system that automatically displays selected items on the desktop and is integrated with the EPR but offers no patient-specific suggestions (e.g. reminders or colourful fonts), and
4) An automatic integration of the EPR system and a knowledge database that includes patient-specific suggestions (e.g. reminders of medications based on patient condition).

Compared to the earlier 2007–2014 surveys, the availability and integration of decision support systems has increased, and fully integrated systems are in more common use among public healthcare service providers. Availability of drug interac-

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[7] http://www.terveysportti.fi/terveysportti/koti (27.9.2018) In Finnish
[8] https://www.ebmeds.org/en/ (5.3.2019)
[9] http://www.medbase.fi/en/professionals/inxbase/ (5.3.2019)

tion support and diagnostic support has reached 100% for the first time in hospitals (Figures 2.5 and 2.6).

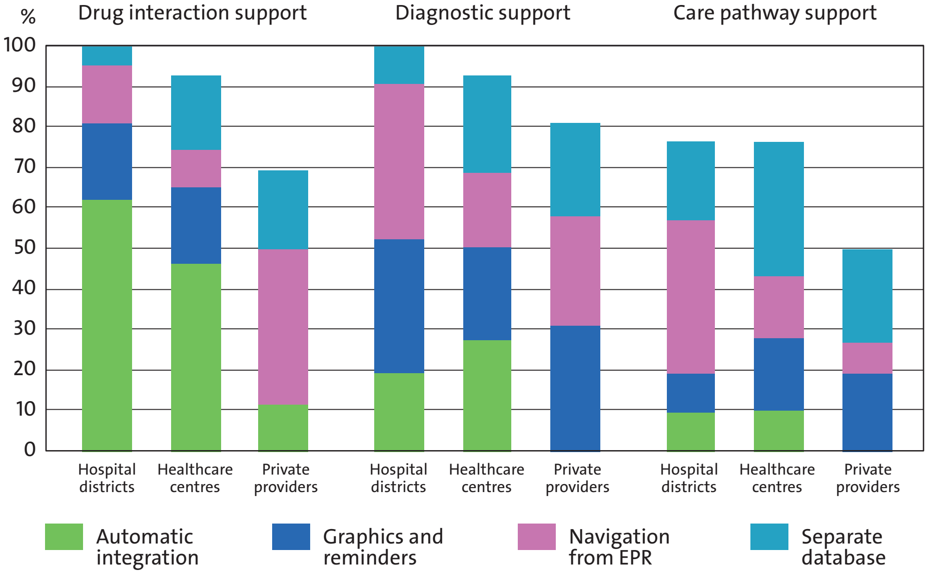

Figure 2.5. Prevalence and integration of decision support systems in Finnish healthcare in 2017.

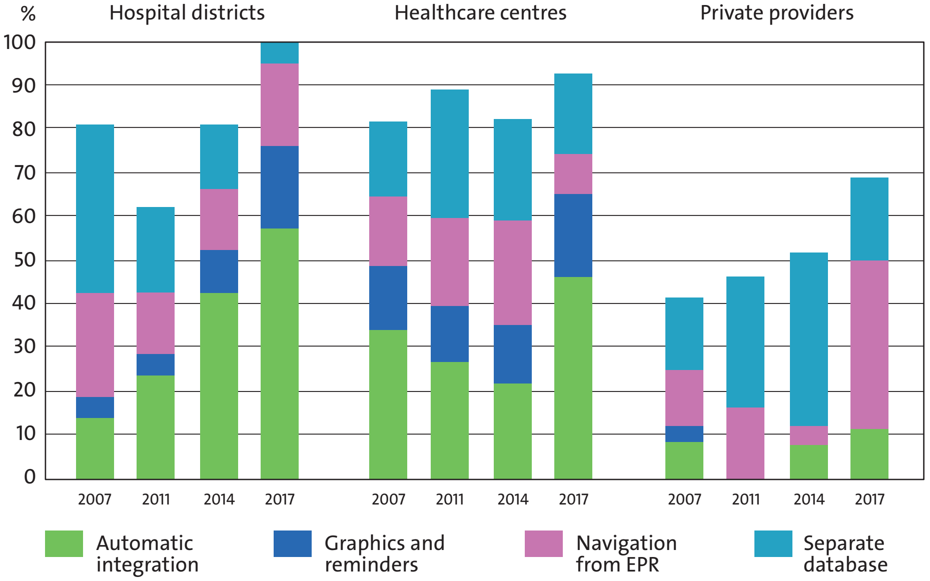

Figure 2.6. History of drug interaction support systems in Finnish healthcare.

2.3 Availability and use of electronic patient information exchange regionally

Two major lines of patient information exchange need to be defined before discussing the many different and yet at the same time partially overlapping forms of data exchange. Firstly, point-to-point services like **electronic referrals** are basically sent to another institution in order to transfer the responsibility for patient care. **Electronic discharge letters** are then returned to the sending institution once the patient's treatment is completed. Instead of a referral, an institution may send an **electronic consultation letter,** if neither responsibility for the patient nor the actual patient is transferred, but professional advice for treatment is expected. There are special cases like **teleradiology** that can be used not only for consultation but also for information distribution; the same applies also to **telelaboratory services.**

The second main type of services, **regional patient data repositories or regional health information exchanges** (**RHIE**) can serve many purposes: they can provide a source of reference information for past treatment, a basis for current patient data distribution in a geographically distributed healthcare environment, as well as a data repository for consultation services and workload distribution. In many cases, RHIEs contain more than just one type of data. They can include e.g. narrative EPR texts, patient summaries, imaging and laboratory data. In normal medical practice, all the various forms of data distribution described above complement each other.

The principal difference between messaging services (referrals) and health information exchange is that the former is mainly used for a specific purpose with a defined information package while the latter can be used on an ad hoc basis but has no connection to a specific patient case and requires more user interaction when selecting the appropriate data.

For collaboration between primary and specialised health care, the most important messages in use today´s workflow are referral letters, consultation letters, and feedback or discharge letters. In addition to a narrative text, the letters can include the results of laboratory tests and radiological examinations. When public primary healthcare and secondary care are within the same administrative organisation or when they use a common information storage infrastructure as enabled by the 2011 law (Health Care Act 1326/2010), the traditional concept of referrals is changing, as a common RHIE can be used as a source of additional patient information.

The Finnish national health information exchange (Kanta services), which enables data retrieval regardless of organisational boundaries and also between private and public health care, is discussed in chapter 1.2. For this chapter 2.3. one should note, that even though all the public healthcare organisation had joined Kanta at the time of this survey, much of the information exchange is taking place in the regional level. This is because RHIE systems have a more tight integration to work processes and also because of their better presentation of some data types, e.g. medical images.

2.3.1 e-referral and e-discharge letters

The e-referral letter is a course of action by which the referring physician, usually a general practitioner, drafts a message with the intention of transferring a patient and the responsibility for care to a hospital which in turn gives feedback in a discharge letter. This e-referral service was in 2014 **available** in all of the 21 **hospital districts,** while the number was 86% in 2014, 95% in 2011, 90% in 2007, 76% in 2005, and 48% in 2003. All of the healthcare centres were able to send e-referrals to specialised healthcare in 2017. The availability has increased since 2014 (Figure 2.7).

Four **private service providers** received electronic referrals from public healthcare centres and three of those also from hospitals. Seven private service providers sent electronic referrals inside own organisation, four to other private care providers and eight sent them to public secondary care (hospital districts). There has been no major change in this functionality compared to 2014.

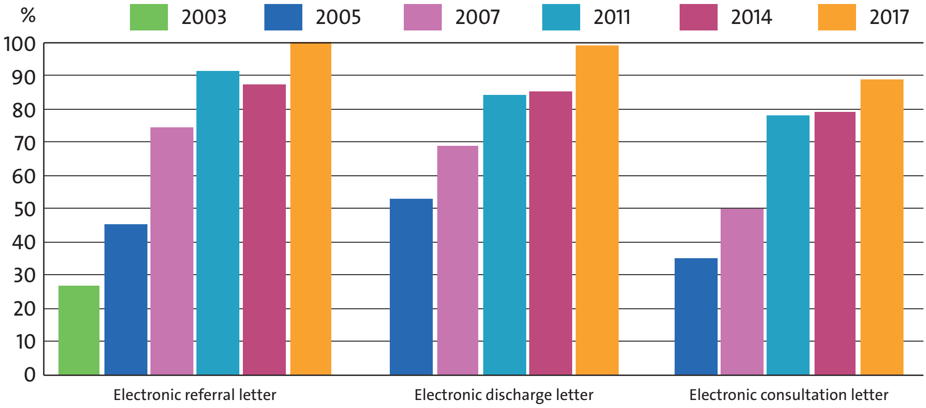

Figure 2.7. The distribution of healthcare centres having electronic referral letters, electronic discharge letters and electronic consultation letters available in 2003, 2005, 2007, 2011, 2014, and 2017.

The **intensity of use** of the electronic referral service in hospital districts has remained at a high level since 2011 (Figure 2.8). In 2017, over 65% of hospital districts informed that the intensity of use for electronic referral and discharge letters had exceeded 90% in somatic specialities. The intensity of use was similar in psychiatry.

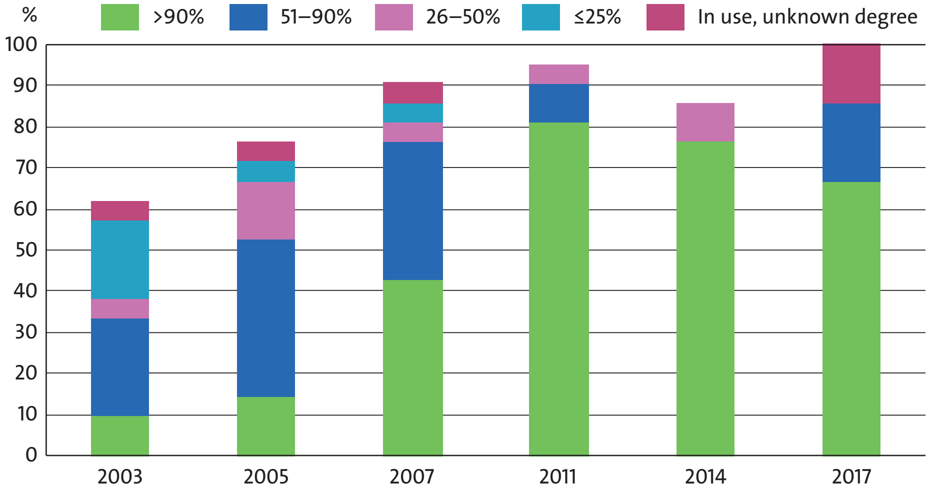

Figure 2.8. The intensity of use of electronic referral letters and discharge letters in the hospital districts in 2003, 2005, 2007, 2011, 2014, and 2017, somatic specialties.

The intensity of use of the electronic referral service in the public healthcare centres parallels the high figures of the hospital districts (Figure 2.9). There is no significant change since 2014.

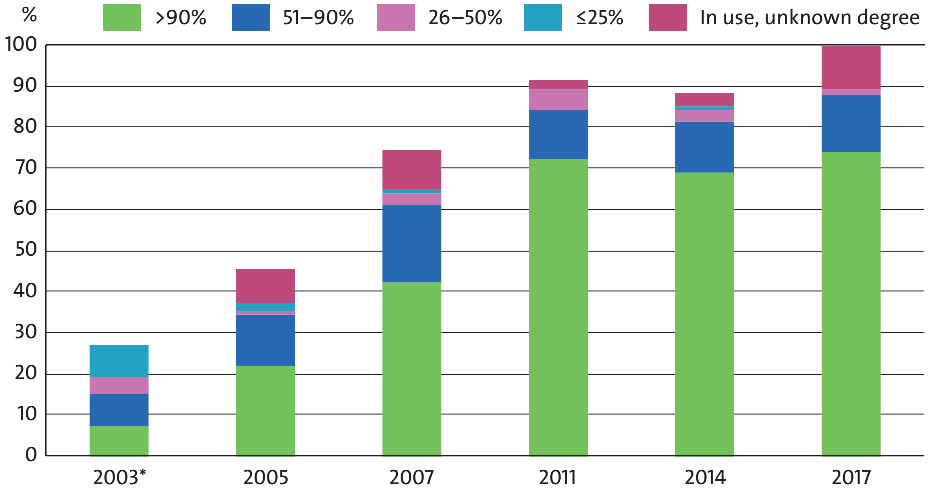

Figure 2.9. The intensity of use of electronic referral letters in public primary healthcare centres in 2003, 2005, 2007, 2011, 2014, and 2017.

After a patient's visit to an outpatient department or bed ward, the hospital mails a **discharge letter** to primary healthcare. A total of 95% of the **hospital districts** sent electronic discharge letters (86% in 2014) and 99% of the **healthcare centres** (84% in 2014) were capable of receiving them. The intensity of use for discharge letters was in 29% of the hospital districts over 90% and in 48% of the hospital districts it was still between 50% and 90%, being in general at the same level as in 2014.

Five of the 26 **private healthcare service providers** in our sample both sent and received electronic discharge letters with another healthcare organisation, while two additional providers had only a sending capability and another two only a receiving capability. The private sector was engaged in these activities more than in 2014.

Treatment and care in a hospital bed ward can continue in the bed ward of a healthcare centre. In these kinds of cases a **document of nursing** is attached to the discharge letter. This nursing information was sent electronically by 47% of the hospital districts to primary care, the availability being higher than in 2014 (38%).

2.3.2 Electronic and remote consultations

The **consultation letter** is a mode of action by which a physician, e.g. a general practitioner, drafts a letter with the intention of obtaining a specialist's advice or opinion concerning the treatment of a patient. The responsibility for care is not transferred to the consultant.

Electronic consultations in somatic care (excludes psychiatry) were offered by 95% of the **hospital districts** and the service had become more widespread since the previous surveys (86% in 2014, 67% in 2011, 52% in 2007, and 38% in 2005). Electronic consultation letters to specialised care was used by 89% of the **healthcare centres.** It has increased from previous survey in 2014 (79%). Most of the progress already taking place by year 2011, when electronic consultation letters were used by 78% of the healthcare centres. The intensity of use among the users has remained in the previous high level (Figure 2.10). Three private service providers reported being able to receive electronic consultations from public primary healthcare.

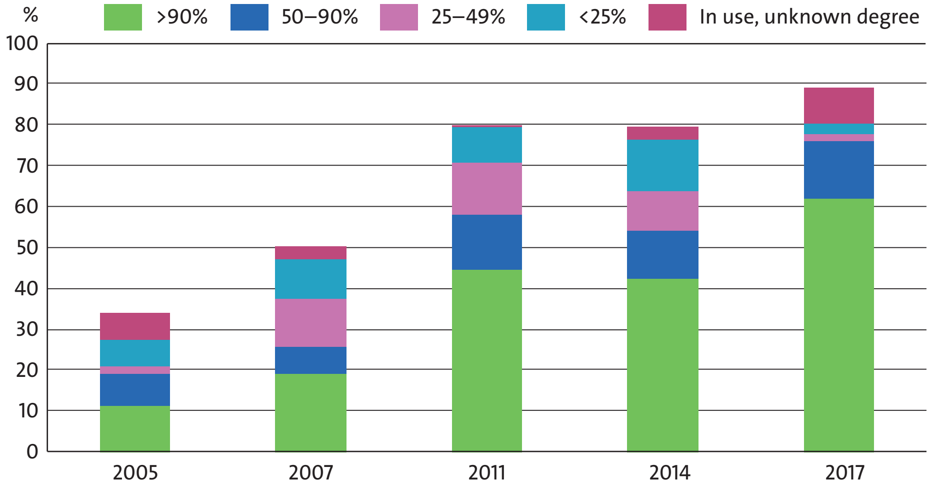

Figure 2.10. The intensity of use of electronic consultation letters in public primary healthcare centres in 2005, 2007, 2011, 2014, and 2017.

The proportion of hospital districts using **teleconsultations via videoconferencing** was 86% in 2017, while it was 67% in 2014. In general, availability seems to have increased rather slowly, and the intensity of use is still low in some organisations. A total of 39% of healthcare centres used video consultations and this availability has increased some from the previous surveys (33% in 2014). However, the intensity of use was still low since 37% of the respondents had used videoconferencing during the last three months before the survey date. Most often the video consultations were used in psychiatry and in neurology (e.g. clinical appointments or telestroke service). Similarly, during the period of the present survey, five of 26 **private healthcare service providers** used above mentioned teleconsultation services via videoconferencing, which is two organisations more than in 2014.

2.3.3 Regional data exchange systems

Many healthcare organisations and institutions make use of regional patient data repositories or a specific RHIE for exchanging patient data. A typical usage scenario of on-demand type data retrieval is when previous patient information or test results are needed in an outpatient consultation or when long term conditions are treated by several care providers. The national HIE, Kanta, discussed in chapter 1.2. has not replaced RHIE systems especially in public health care.

According to year 2017 survey, 90% of the 21 **hospital districts** have a specific regional patient data repository in clinical use, same as in the 2014 survey and close to the figures in two previous studies before that (86% in 2011 and 81% in 2007). The main development took place after 2005, when the figure was only 42%.

A very important step forward since the survey in 2011 has been a law (Health Care Act 1326/2010) that allows public healthcare to build common patient registries for secondary care (hospital districts) and primary care (healthcare centres) in each of the regions. A specific consent from an informed patient is no longer needed for information retrieval, and the regional patient data repositories are more useful.

There is no single technical solution for accessing these regional data repositories, though three main categories could be identified in hospital districts (Hyppönen et al. 2019):

1) The **master patient index model** was in use in 10% of the hospital districts. Users access an index of the original data from a centralized reference database via a separate user interface. Each of the indexed data items must be viewed (pulled or queried) separately. The users of practically all EPR system brands and organisations have access to data, but only to selected information such as notes, laboratory results or images i.e. not the whole patient record. Users at primary and secondary care have an equal access to data.

2) The **web distribution model** was used in 20% of the hospital districts. Users can have full access to a web-based electronic record of patient data from secondary care. That includes all texts, radiological results and laboratory data. This model is asymmetric: while all data from secondary care is available, no text data from primary care is exchanged. There are however separate common repositories for imaging and laboratory data.
3) **Regional virtual EPR model** was utilised in 60% of the hospital districts as their principal regional data repository. In this most popular model, all users at primary and secondary care are using a common EPR user interface to a regional patient data repository, which can be a single repository or a virtual combination of repositories. Imaging and laboratory data may still have separate archives, which may be accessed as part of the same EPR-system (integrated functionality) or as a separate regional data repository.

Those 10% of hospital districts that did not have a formal regional data repository had nevertheless developed alternative means of distributing imaging and laboratory data and 5% an alternative way to exchange core text data with the healthcare centres in the region.

When it comes to the content, regional patient data repositories or RHIE can exchange many different types of patient data, from images to biosignals, but their primary function has been the exchange of narrative texts. According to this survey, the regional exchange of narrative texts, including delivery, receiving and remote reading, was being set up through their RHIE in 86% of the hospital districts, that of laboratory results in 81%, that of radiological images in 48% and imaging statements (reports) in 86%. The figures for 2011 were 86%, 86%, 71% and 86%, respectively. Especially for laboratory services and medical images alternative solutions have emerged as will be discussed later.

In summary, if one counts up all the different means of distributing patient information on-demand regionally (RHIE, separate imaging and laboratory databases, other means of delivery), 95% of the hospital districts are capable of distributing text data while 100% of the hospital districts are capable of distributing imaging data (both images and reports). This high level of regional health information exchange services was achieved by the time of the last survey in 2011 and has even improved for text exchange. The development between the years 2003–2017 is shown in Figure 2.11.

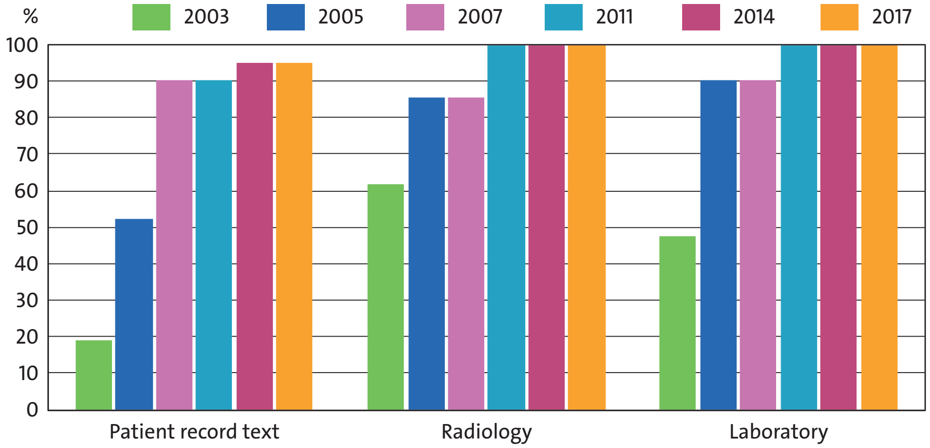

Figure 2.11. Regional electronic exchange of patient information in hospital districts with all means in 2003, 2005, 2007, 2011, 2014, and 2017.

A new implementation of RHIE is a data repository that caters for the special responsibility area of each of the five university hospitals in Finland. Each of these large area repositories caters for services for many individual hospital districts in that area: 48% of the hospital districts have joined this type of geographically larger repository for their text data, 10% laboratory services, 10% of the hospital districts for their imaging services, and 29% for the exchange of digital ECG. More have plans to join one in the near future (29% for imaging data and 24% for laboratory data).

In **public primary care,** a total of 79% of healthcare centres were connected to some formal RHIE. Similar with the hospital districts, some healthcare centres were connected to more than one regional data system (25% of respondents). If all the means of communicating data are considered, exchange of patient record text is used by 85%, radiological images by 94% and laboratory results by 91% of the healthcare centres. There has been a steady increase from previous studies, as seen in figure 2.12.

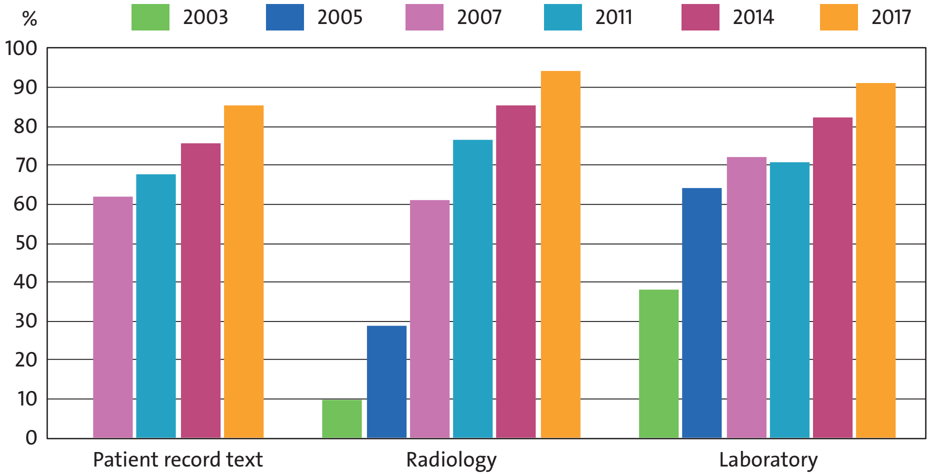

Figure 2.12. Regional electronic exchange of patient information in public primary healthcare centres by all means in 2003, 2005, 2007, 2011, 2014, and 2017.

Among **private service providers,** in our sample of 26 respondents, exchange of EPR text was used by two, laboratory results by one, medical images by five and imaging reports by four respondents.

In practice, regional on-demand information retrieval has grown to become an important tool for medical professionals as messaging services between primary and secondary care were previously. As a new trend after the previous survey, a common medical record for public primary and secondary care seems to fulfil many of the tasks that were previously solved with a messaging system or with a health information exchange. Private sector service providers have not been able to use regional information exchange and therefore they have relied more on the national Kanta services.

2.3.4 Teleradiology and image distribution through a regional archive

Teleradiology was one of the first applications of telemedicine in Finland. The first experiments took place as early as in 1969 (Reponen and Niinimäki 2006) and real implementation started at the beginning of the 1990s. In 1994, all five university hospitals had teleradiology services (Reponen 1996). Regular service started in the sparsely populated northern areas but has since then spread all around the country (Reponen 2010).

Teleradiology includes by definition either radiological teleconsultation or even clinical teleconsultation based on teleradiological transmission. In Finnish public health care, most primary healthcare centres have x-ray imaging capabilities. Healthcare centres also create and store their images digitally and have thus either a PACS or a connection to a regional PACS. Many of the imaging studies in the healthcare centres are primarily interpreted by the general practitioner, and a consultation is requested if needed. However, within Finnish public health care, dedicated teleradiology links are practically no longer needed, thanks to regional PACS implementations. Moreover, the borderline between teletransmission and image distribution through a regional archive is gradually vanishing. If a healthcare centre needs the images made in the hospital for comparison purposes, those can be transmitted (teletransmission) or viewed on-demand from the regional archive/repository (if one exists). In our surveys, we have investigated all the methods used for image transfer. With the current infrastructure, teleradiology is a matter of service agreements between the partners.

In our series of surveys, 100% of the **hospital districts** provided teleradiology services within their responsibility areas in 2017, the situation having been the same since 2011. These figures were 81% in 2007, 76% in 2005 and 62% in 2003. For **healthcare centres** corresponding figures were 94% for 2017, 85% for 2014, 76% for 2011, 56% for 2007 and 22% for 2005. The results show that teleradiology is an established service in Finnish public healthcare and that healthcare centres are catching up in utilising the service provided by the hospital districts. Our survey did not reveal how many service contracts nowadays exist between public healthcare units and **private service providers.**

2.3.5 Information exchange with social care from a healthcare perspective

In Finland an increasing amount of information within social care is available electronically and close collaboration between healthcare and social care is important.

The information change between social and healthcare has increased since year 2014. In 33% of the **hospital districts** (10% in 2014, 19% in 2011) it was possible to access client information that existed in a social care organisation with the permission of the client, while 62% (29% in 2014, 38% in 2011) allowed social care organisations to have access to healthcare information in hospital districts.

At the **healthcare centre** level, 38% (29% in 2014) had access to read social care information with the permission of the client and 54% (44% in 2011) allowed social care organisations to have access to the healthcare information of the client. This is a clear increase compared to earlier results.

2.3.6 Standards for data exchange between organisations

Finnish registries use international classification systems such as ICD-10 and ICPC-2. The EPR Minimum Data Set will also be coded on the basis of these classification systems. In terms of communication and security, Finland has chosen to adopt international standards, such as Health Level 7 (HL7) and DICOM, and the ISO 17799 standard for Information Security Management (based on the BS7799).

The older Electronic Data Interchange (EDI) standard was still in use in similar numbers as in previous surveys. The use of CDA R1 continues to decline and the use of R2 increase. XML messaging in total is in use in about 2/3 of healthcare organisations (Table 2.2). CDA R2 is in use in Kanta and DICOM in local and regional PACS, and the healthcare centres' own announcements are lower than in reality.

In the sample of 26 private service providers, 14 respondents announced that they were using at least one of the standards mentioned. The most often named was DICOM (n=12), followed by HL7 CDA R2 (n=8), HL7 CDA R1 (n=6), and EDI (n=3) and XML messages (n=2). There has been some increase in the use of named standards compared to 2014, especially in DICOM and HL7 CDA R2, which are demands for Kanta connection.

Table 2.2. The most often used standards for data exchange between organisations in public healthcare in 2005–2017 as a proposition of healthcare units.

		%				
		OVT/EDI	**HL7 CDA-R1**	**HL7 CDA-R2***	**XML-message**	**DICOM***
Hospital districts	2017	43	33	95	67	100
	2014	38	67	52	81	100
	2011	30	70	40	70	90
	2007	21	79	26	84	90
	2005	67	72	22	67	94
Healthcare centres	2017	18	32	46	64	60
	2014	17	49	42	62	61
	2011	12	57	35	58	45
	2007	15	60	16	60	41
	2005	39	61	14	46	33

*Demanded for Kanta use

2.4 Availability and use of e-health services for patients (PHR, portals)

The results on information exchange between healthcare organisations and patients are described below with an overview of services provided through organisational web-sites and some of the most common services are discussed in detail.

2.4.1 Availability of information

All organisations in all three responder groups (hospital districts, healthcare centres, and private service providers) had own **websites.** A summary of the general content of the services available in these web pages can be seen in Figure 2.13.

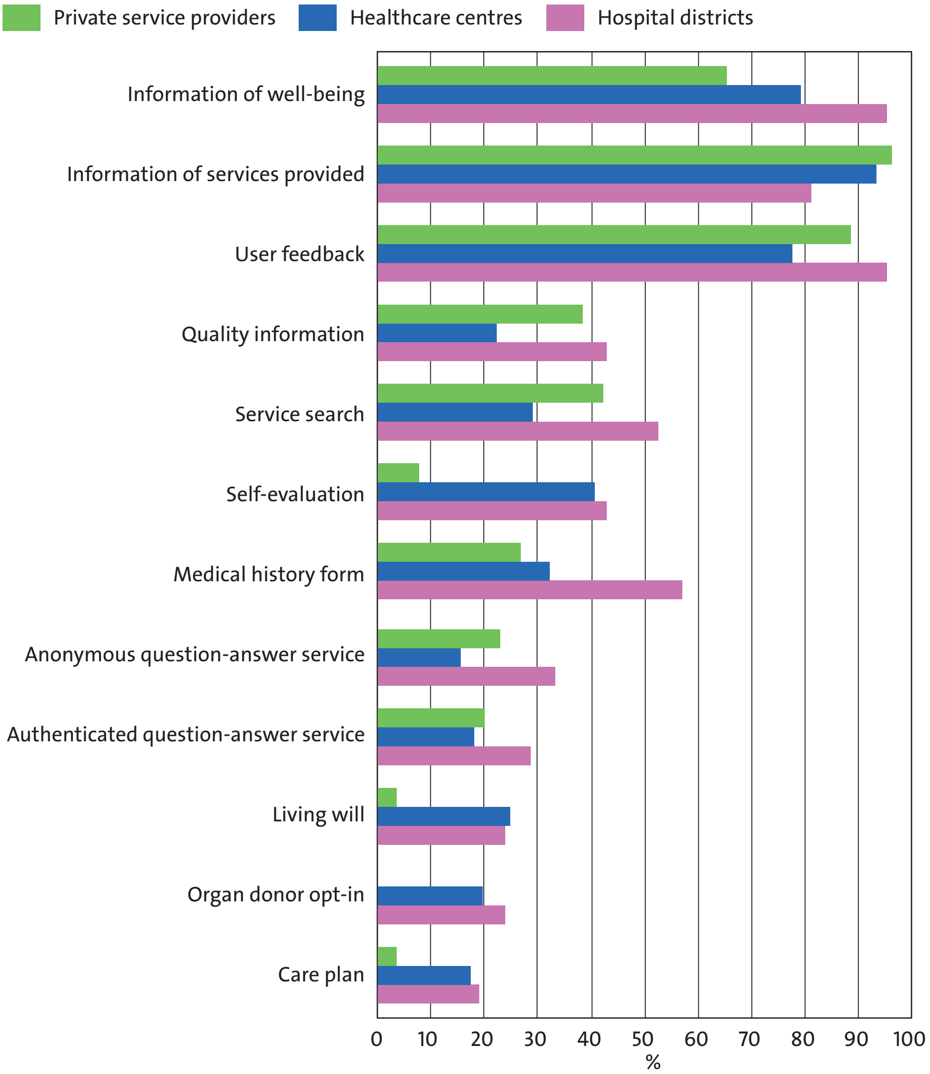

Figure 2.13. Services offered from an organisation's web pages.

Information on services and locations was available on nearly all websites already in 2014, now the same high prevalence exists for online feedback. Availability of self-evaluation and online medical history form services has increased clearly, also the availability of making a living will or organ donor registration has increased. Other functionalities accessed through the webpages or otherwise are discussed below.

2.4.2 Electronic appointment booking services

Online appointment booking means that a patient can reserve an appointment with a physician over the Internet. In the context of making an appointment in Finland, primary healthcare physicians have the role of gatekeeper to specialised health care. For this reason, primary healthcare and specialised healthcare differ when dealing with appointments.

In 2017, the availability of direct online appointment booking through webpages has increased. It was in use in 90% of **hospital districts** and 59% of **healthcare centres** in Finland. The most common use is for laboratory appointments, but also, maternity- and child health clinics and oral health are typical users. Use of the service has increased (Figures 2.14 and 2.15). In our sample of 26 **private service providers** direct online appointment booking through webpages was available for 20 respondents.

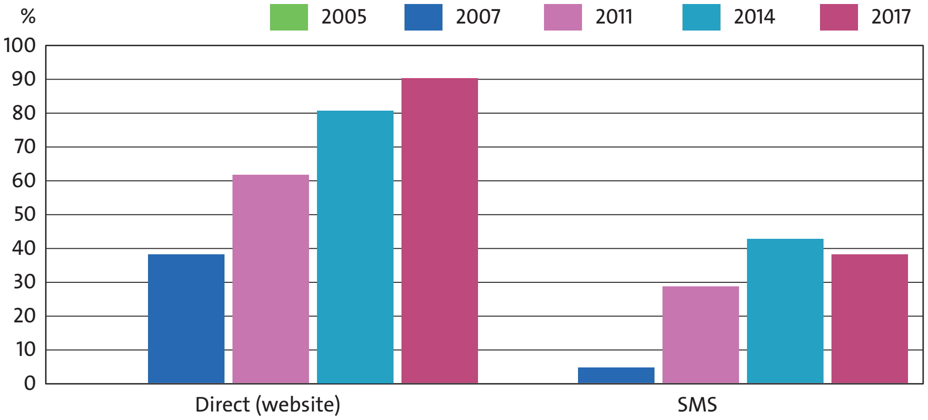

Figure 2.14. Electronic appointment booking services in hospital districts in 2005, 2007, 2011, 2014, and 2017. None of the hospital districts had these services in 2005.

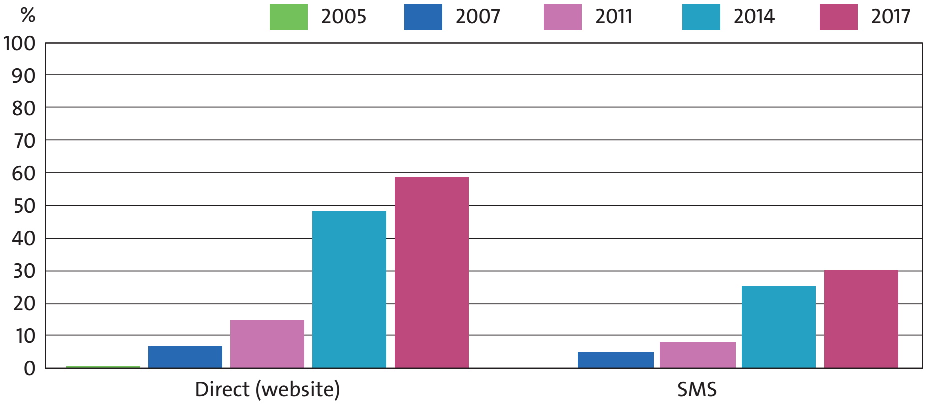

Figure 2.15. Electronic appointment booking services in healthcare centres in 2005, 2007, 2011, 2014, and 2017.

Availability of short message service (SMS) appointments has also increased in **hospital districts** where the availability in 2017 was 38% and in **healthcare centres** with availability of 30% (Figures 2.15 and 2.16). In our sample of 26 **private service providers,** SMS appointment making, confirmation, or cancellation was available in 16 organisations.

2.4.3 Direct communication between patients and professionals

Question–answer services and contact methods

The availability of a **web-based anonymous question–answer service** was at the same level as in 2014, being used in 33% of hospital districts, in 16% of the healthcare centres, and 6/26 of private service providers. **A web-based question–answer service with patient authentication** was available in 28% of the hospital districts, while 19% of healthcare centres and 5/26 of private service providers offered this service.

Information exchange between professionals and patients has increased and changed its type, from the continuously declining use of basic email to increasing availability of more secure channels. Ordinary email was used in 10% of hospital districts, 6% of primary care centres, and 4/26 private providers; encrypted email in 52% (29% in 2014) of hospital districts, 35% of healthcare centres and 19/26 private providers. SMS communication was available in 14% of hospital districts, 40% of healthcare centres and 8/26 private providers. The history of the availability of these forms of communication in primary healthcare is shown in Figure 2.16.

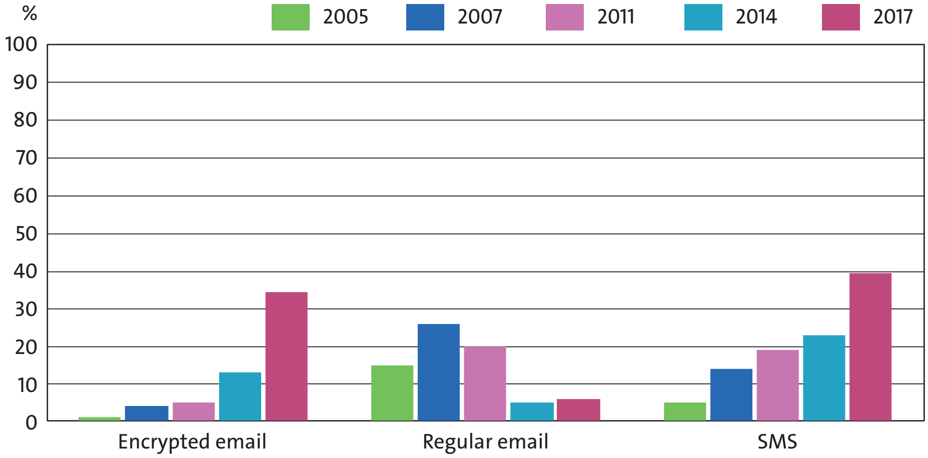

Figure 2.16. Electronic messaging between health professionals and patients in healthcare centres in 2005, 2007, 2011, 2014, and 2017.

Access to personal health information and e-prescription data

In addition to the national service My Kanta Pages which allows citizens to view their own summary of the EPR and e-prescription information, organisations can also provide their own services for citizens to view or add information in systems related to healthcare records. The availability of these own services (Table 2.3) has not increased since 2014, and in some cases, like medication, the availability has decreased.

On average 61% of citizen's requests to renew prescription were made electronically in hospital districts. Some (10%) of the hospital districts had their own electronic system for citizens and 66% used the Kanta functionality. Organisation's own system for an electronic viewing of e-prescription was available in 10% hospital districts, 19% of primary healthcare centres, and three private providers.

Table 2.3. Citizen access to their own EPR information locally in healthcare organisations in 2017, divided by information type.

	Medications	Laboratory results	Diagnoses	EPR text
Hospital districts (%)	10	25	10	0
Primary healthcare centres (%)	14	19	12	7
Private providers (n)	3	4	3	3

Personal health records and entering citizen recorded health information

The prevalence and interest in personal health records (PHR), that archive patient-produced data, has also increased some since 2014 (Table 2.4), especially for hospital districts. Citizens are increasingly able to send measurements and test form information to professionals locally. Citizen initiated recording of measurements was now available in 33% of the hospital districts (19% in 2014), 19% of primary healthcare centres (13% in 2014), and 4/26 private providers; citizen initiated recording of text information was available in 43% of hospital districts (29% in 2014), 20% of primary healthcare centres (13% in 2014), and 3/26 private providers.

Table 2.4. Availability of local personal health records in 2017 in hospital districts, healthcare centres, and in private service provider.

		% (number of organisations)		
		In planning	In testing	In use
Hospital districts	2017	29 (6)	5 (1)	14 (3)
	2014	43 (9)	10 (2)	5 (1)
	2011	33 (7)	5 (1)	0 (0)
Primary healthcare centres	2017	14 (7)	2 (2)	6 (5)
	2014	27 (35)	3 (4)	7 (9)
	2011	16 (22)	2 (3)	1 (2)
Private	2017	11 (3)	0 (0)	8 (2)
	2014	20 (4)	0 (0)	10 (2)
	2011	14 (4)	4 (1)	0 (0)

2.5 Availability of human and material resources

2.5.1 Professional education and training

The availability of web-based training for personnel was at the same level as in 2014, and in 2017 it was available in 100% of central hospitals, in 95% of healthcare centres, and in 16/26 private service providers. Education was mainly regarding medication, software, privacy and data security, patient security, procedures, and radiation safety.

2.5.2 Computer skills of healthcare personnel

The proportion of organisations where all personnel who documented or read patient information had computers was already 90% both for secondary and primary care in 2007 (Hämäläinen et al. 2009). In a similar manner, in about 83% of the hospital districts and healthcare centres all the personnel involved in providing or reading patient information had access to the Internet. Given such high saturation, these questions were no longer included in the surveys in 2011 and after.

The ICT skills of the personnel were measured by asking the proportion of personnel documenting and reading patient information who had basic computer skills. In 2017, over 70% of hospital districts and almost 70% healthcare centres informed that all of the personnel documenting and reading patient information had basic computer skills. The trend has been moving towards the 100% saturation point of computer skilled personnel, except for the minor decline in 2014 (Figures 2.17 and 2.18). Among private healthcare providers, majority (18/26) of the personnel had basic ICT skills and in the rest at least 50% of the personnel.

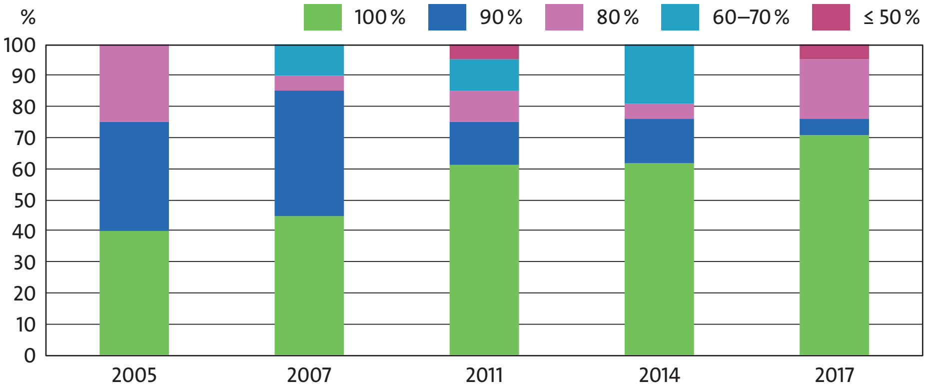

Figure 2.17. Distribution of hospital districts based on the proportion of personnel with basic ICT skills documenting and reading patient information. Values of 50% or below were combined into a single group.

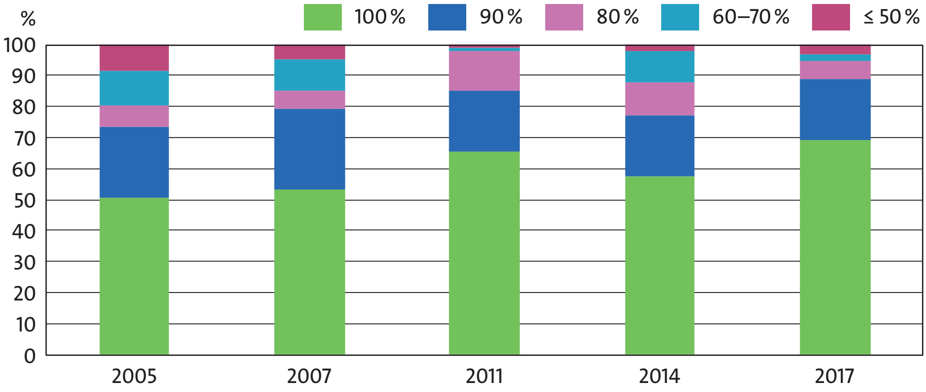

Figure 2.18. Distribution of healthcare centres based on the proportion of the personnel with basic ICT skills documenting and reading patient information. Values of 50% or below were combined into a single group.

Privacy training was received comprehensively by the personnel in 76% and to some extent in 24% of hospital districts. In 76% of healthcare centres personnel had received comprehensive privacy training, and the majority (96%) of personnel had received at least some privacy training. Among private sector samples, 18/26 organisations had provided comprehensive and 8/26 some privacy training. There was a slight improvement at the level of training when compared to 2014.

2.5.3 Technical support availability for users of the patient record system

The availability of technical support in public organisations is higher in hospital districts than in primary healthcare centres (Figure 2.19). Among **private service providers,** the service was most often provided during all operating hours (15/26) or during office hours (10/26), and one not providing support in daily bases.

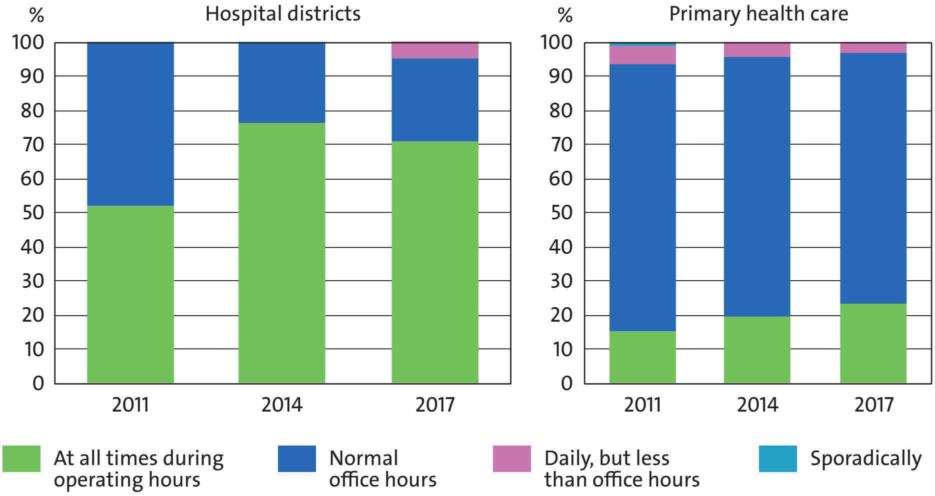

Figure 2.19. Technical support availability for the EPR in specialised and primary healthcare in 2011, 2014, and 2017.

2.5.4 Costs for Systems of Information and Communication Technology in e-health

In the questionnaire, organisations gave estimation on their annual costs (in EUR or as a percentage of total budget) in 2016 for purchasing, maintaining and developing information and communication technology and for training. In the hospital districts the proportion of the ICT budget varied from 0.8% to 5% being more evenly distributed as also in 2013 when compared to earlier years (Figure 2.20). From 2005 to 2013 the median value of ICT costs has varied from 2% to 3%, now in 2017 being 2.8%. Over half of hospital districts (57%) estimated that the percentage of their budget used for ICT systems in 2016 had gone up compared to 2015.

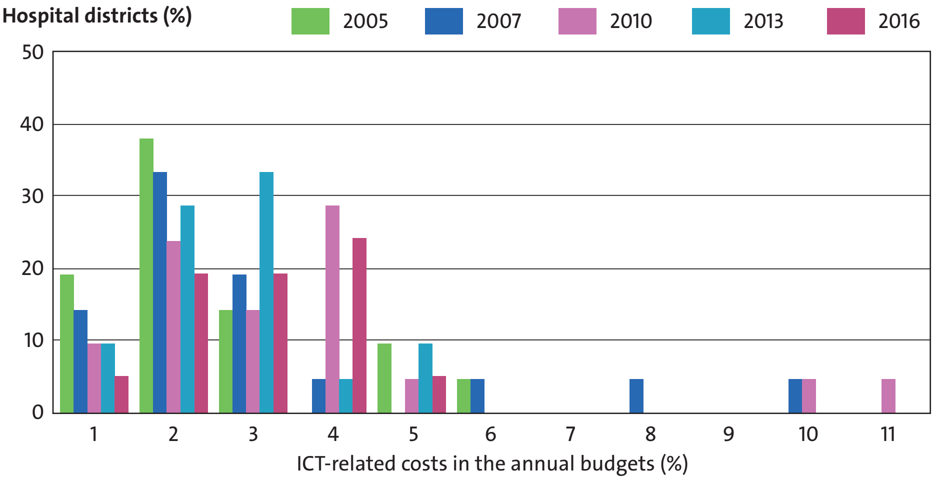

Figure 2.20. Distribution of hospital districts based on their estimations of the proportion of ICT-related costs in the annual budgets in 2005, 2007, 2010, 2013, and 2016. Costs are presented as the current prices at the time point of the survey.

In the healthcare centres the ICT-related annual costs had a median value of 2% in 2017 which is about the same level as in 2014 (1.8%). As in the case of hospital districts, 57% of the organisations estimated that the percentage of their budget used for ICT systems in 2016 had gone up compared to 2015.

The situation was much the same with private service providers since 60% of those who answered the question, estimated that the percentage of their budget used for ICT systems in 2016 had increased. However, the median value of budget in 2016 was 2.25% instead of 3% in 2013. The ICT costs as a percentage of the budget remains at the same level as in other Nordic counties (Jerlvall and Pehrsson 2014).

Hospital districts' ICT-related costs in 2007, 2010, 2013, and 2016 are presented as EUR per capita in Figure 2.21. Per capita costs can be used, since in Finland everybody belongs to the population of a healthcare centre that in turn belong to a hospital district according to their residence. The median of annual costs per capita in hospital districts has increased from EUR 23.7 in 2007 to EUR 48 in 2016 (Figure 2.21). **Costs are presented as the current prices at the time point of the survey.**

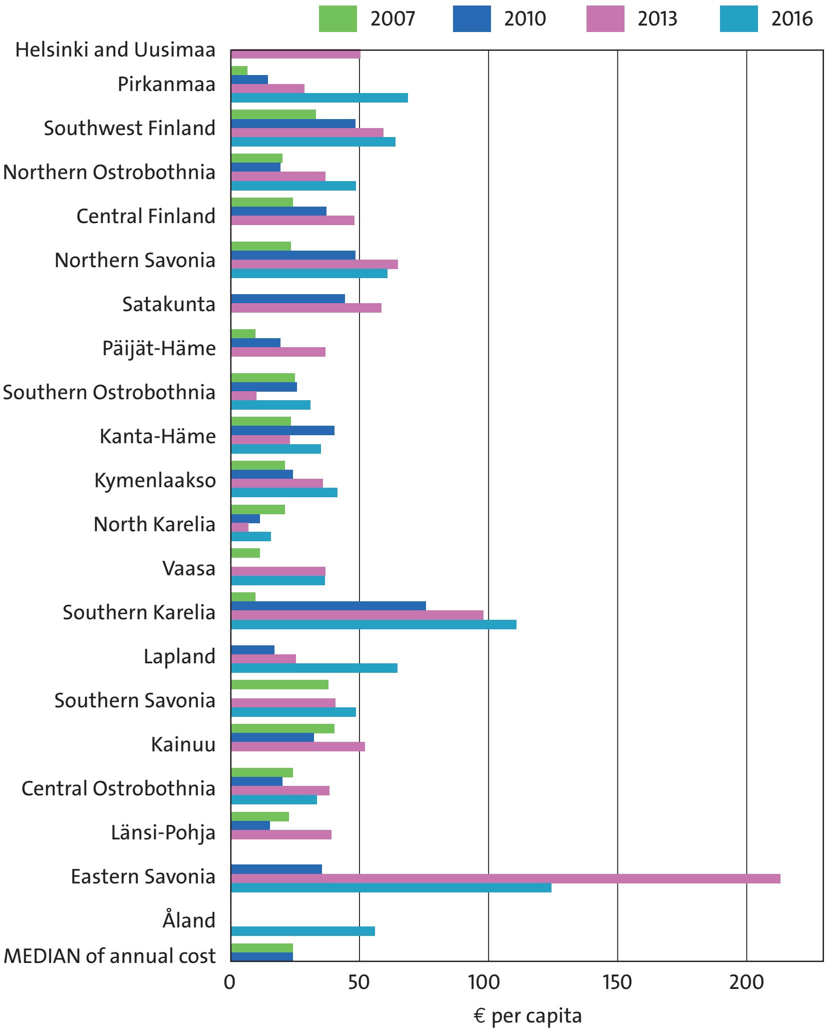

Figure 2.21. Annual ICT related costs (€) per capita in the 20 hospital districts in 2007, 2010, 2013, and 2016.

The two highest ICT costs per capita were in the Eastern Savonia and South Karelia hospital districts (Figure 2.21). This was also the case in 2014 survey. In South Karelia primary, secondary and social care were merged into one organisation between 2007 and 2010, which partly explains the large increase between these time points. The biggest increase in health care healthcare per capita costs from 2010 to 2013 were in the Eastern Savonia hospital district, which was in 2013 the first organisation to connect to the Patient Data Repository in the national Kanta services, and was also participating in the testing of the national procedure. The Eastern Savonia hospital district has also shown high performance on the Healthcare Information and Management Systems Society (HIMSS) Analytics Europe evaluation following their European EMR Adoption Model, being the first one to achieve a level 6 out of 7 in

Finland (Pätsi 2012). This hospital district had also one of the highest overall health and elderly care costs in Finland10.

2.6 Availability of management and data safeguarding systems in health care

2.6.1 Management systems supporting the quality and delivery of healthcare service

An electronic registry for various care-related adverse events has been remained at the same level in hospital districts and in primary healthcare. Majority of the hospital districts (95%) and the primary healthcare centres (97%) used such a register, while the figures in 2014 were 95% and 91%, respectively.

Accurate process information concerning the performed processes and services related to resources is essential in governing healthcare enterprises. The availability of data warehouse systems and other administrative support systems has increased in some extent since 2014. They remain more prevalent in hospital districts than in primary healthcare (Figure 2.22). In private sector, such functionalities were quite generally in use.

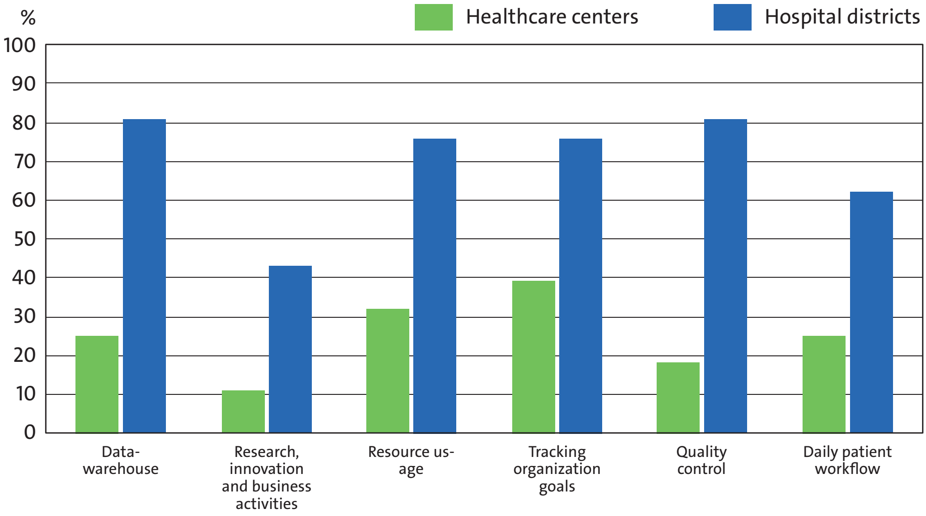

Figure 2.22. Prevalence of datawarehouses and integration of administrative databases into EPRs in Finnish public healthcare in 2017.

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[10] https://thl.fi/fi/web/sote-uudistus/talous-ja-politiikka/kustannukset-ja-vaikuttavuus/rahoitus/tarve-vakioidut-menot (25.2.2019) In Finnish

2.6.2 Systems supporting data security

Moving over to electronic documentation, archiving and transferring of data has meant that data security has become even more important. Legislation on data security in healthcare concerns different dimensions. The data security policy of an organisation should include the aims and responsibilities for data security. The proportions of health service providers with a documented data security policy, data security plan, and a designated person in charge are shown in Table 2.5. Compared to the 2014 survey, the availability of those components has increased.

Table 2.5. Proportions of health service providers with documented data security policy, data security plan, and a nominated person in charge.

	Data security		
Provider	**Policy**	**Plan**	**Data protection officer**
Hospital districts (%)	100	81	100
Healthcare centres (%)	89	90	98
Private providers (n)	23/26	24/26	24/26

At the hospital district level, 51% of organisations had a Business Continuity Plan (BCP) and 71% a Disaster Recovery Plan (DRP). These figures are a little bit lower than in 2014 survey. About 33% of organisations had been following some recovery plan actions, mainly because of power failure or malware prevention. Typically the permissible down time for the EPR system was specified as between 0.01–1% of usage time, while in 2016 the actualized time was 0–1%.

2.6.3 Management of informed consent

New legislation on patient consent came in to effect in 2011 (Hämäläinen et al. 2009). In public healthcare, service providers within one hospital district area can jointly build a common patient data registry. All the personnel that are involved in patient care either in primary healthcare or secondary care can utilise patient data provided the patient is informed. The patient has also a possibility to withhold his/her consent. The private sector or other hospital districts are considered different organisations and in this instance patient consent is needed to access patient records.

The national Kanta service now includes a component that enables the patient to give his/her consent to those different organisations and service providers that participate in treatment. This centralization will make consent management easier for those public and private organisations that are connected to Kanta services.

2.6.4 Electronic identification of healthcare professionals

The saturation point of all institutions using strong identification with smart cards for healthcare professionals has been achieved following the implementation of the national e-prescription component in the Kanta services. In addition to Kanta-functionalities, the smart card identification was also used to other activities, such as signing on electronic systems.

2.6.5 Electronic identification of patients

Healthcare organisations provide some electronic services requiring identification of patients. Among **hospital districts** identification of patients in electronic services was in use in 76% or organisations. The method was based on the national Suomi.fi – service (includes options for smart card, online bank ID, or mobile identification) in 43% of organisations. In addition, online bank ID was used in 76%, mobile identification in 52%, and smart card in 48% of organisations. User name and password were used in 33% or organisations.

Among **healthcare centres** the national Suomi.fi – service was used in 17% of organisations. In addition, online bank ID, mobile identification, smart card, and user name and password were used in 55%, 37%, 26% and 17% of the organisations, respectively.

Among **private service providers,** the national Suomi.fi identification service was in use in one organisation, in addition smart card via other service was used in one, online bank ID in six, user name and password in nine, and mobile identification in two of the organisations.

Self-registration for appointment with a registration machine was in use in 72% of hospital districts. The functionality was more widely available than in 2014.

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Legistlation:

Act on Health Care 1326/2010

3 Availability and use of e-welfare in Finland

Sirpa Kuusisto-Niemi, Hannele Hyppönen, Salla Ruotsalainen

Social welfare[11] covers a wide range of activities to all age groups in Finland: from counselling, open and institutional care to financial support. One of the core purposes of social welfare's information management is to organise information in a way that it is found there where the client is served. This includes national, regional and local service providers both in public and private sectors. The earliest information and communication technology solutions in social welfare, like client information systems and invoicing systems, date back to 1980's. Since the 2000's different electronic services targeted to citizens have become more common also in social services.

During the last 20 years, social welfare information and communication technology preparedness have been promoted with organisations' own resources on national, regional and local levels. One of the focal development projects of the electronic information management in social welfare was National Project of IT in Social Services (Tikesos) between 2005 and 2011, funded by Ministry of Social Affairs and Health (STM). The project aimed to support the information technology development ascending from the needs of social services field in co-operation with regional and local actors and stakeholders. The project designed and created a rationale for national information management enterprise architecture in social welfare and defined uniform operating processes. Further, it created a data model for client information systems (CIS) to be used in social services (Ailio, Kärki, 2013).

In the 2000s', altogether four national information system surveys were published, the first one in 2001 (Hartikainen et al., 2002). After the Tikesos project, another information system survey was conducted in 2010 (Kärki et al., 2012). Implementation project on national information system services and standardized documentation in social welfare services (Kansa project) was established in 2015 (Laaksonen et al., 2015) after the third social welfare information system survey in 2014 (Kärki, Ryhänen, 2015).

Act on Client documentation in Social Care (254/2015) came to force partly on the 1st of April 2015. It will be fully forced on the 1st of January 2021. At the same time amendments to the Act on the Electronic Processing of Client Data in Healthcare and Social Welfare (159/2007) were made. These amendments were preparations for the implementation of the national client data archive for social services as a part of the Kanta services. Saving the documents in the data archive of social services began in 2018 and the functionalities of the archive will expand during 2020.

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[11] 11 Terms 'social welfare' and 'social services' are used synonymously in this chapter. Both refer to public and private organisations' services targeted to promote the wellbeing in everyday life of the citizens. These services are being defined by the legislation, but type of service and procedures vary according to the local circumstances. See: https://stm.fi/en/social-services. -Municipalities may also offer other social services they develop to answer the local needs.

All client documents produced in public or private social services will be saved in the Kanta services. It is expected that by the end of 2019 approximately 50 organisations will join as users of the service, from both private and public enabler of social services. The fourth information system survey of social welfare was timed to the beginning of the use of client data archive for social services (Kuusisto-Niemi et al., 2018)

The use of Kanta services in social services requires that the aims, methods and actions of information management are based on common national procedures. This chapter will cover social services' infostructure, client information systems used in social services and digital social services provided for citizens. Further, the chapter will cover the prerequisites for the implementation of the planned client information systems for social services. This chapter is based on a national survey conducted in 2017 that covers the implementation of social welfare client information systems (CIS) and data management in public and private organisations in Finland (Kuusisto-Niemi et al., 2018). The current survey is a continuation to the surveys conducted in 2014 and 2010, which have been reported in English in previous checkpoint-reports (Hyppönen et al., 2015) 2015 and 2011 (Hämäläinen et al., 2013).

3.1 Data collection and comparison to 2010 and 2014 surveys

The survey of e-welfare was conducted as part of the national eHealth and eWelfare monitoring (STePS), funded by STM. The survey was planned in 2016 and carried out in the spring of 2017. The data collection for the survey was carried out as a semi-structured Internet-questionnaire. The target groups of the survey were all public and private social service providers in Finland. The survey was commissioned by the National Institute for Health and Welfare (THL), and the data were collected and analyzed by University of Eastern Finland.

The survey was sent to all those public and private actors who provide social services in Finland. Public service providers include municipalities (N=311), part of them which had formed a joint municipal authorities for service provision and joint institutions for intellectually disabled (N=16). Private service providers (N=3,971) included companies, associations, foundations and organisations with business or professional activities.

Earlier surveys from 2011 and 2014 were used as a guideline when designing the survey aiming for consistency and comparability when possible. Based on the experiences from the earlier surveys the number of questions was narrowed down and clarity was improved. Further, Information to support well-being and service renewal – eHealth and eSocial Strategy 2020 (later: Strategy), launched by STM steered the survey design. The questions were grouped as follows:

- Professionals – Smart systems for capable users: question related to e-welfare service availability, documentation, usability and competence – Chapter 3.2

- Service system – Effective utilisation of limited resources: questions related to information exchange in social welfare and between social welfare and other service providers. Further, questions related to information management resources were explored. – Chapter 3.3
- Citizens as service users – Doing it yourself: questions related to supply of e-welfare services provided for citizens – Chapter 3.4
- Steering and cooperation in information management: questions related to knowledge, steering the information management, architecture and cooperation in social services. – Chapter 3.5
- Infostructure: questions regarding common standards and definitions – Chapter 3.6

Electronic questionnaires were produced separately for public and private providers of social services and participants were able to answer them either in Finnish or Swedish. National Institute for Health and Welfare (THL) generated the questionnaire using their online questionnaire service. The questionnaires were piloted among the Health and Human Services Informatics Master's Degree students from the University of Eastern Finland who worked in social services. University of Eastern Finland conducted the survey, sending the link to the electronic form to the lists of respondents. The THL online questionnaire service displayed the survey for the respondent and saved the answers into a secure database. Respondent information of public service providers' side was obtained in February 2017 from the customer relationship management (CRM) register administered by STM. National Supervisory Authority for Welfare and Health (Valvira) provided the contact information on private service providers from the Valveri register in February 2017. To update the register information, Internet searches were performed e.g. on The Association of Finnish Local and Regional Authorities' web site, municipalities, joint municipal authorities' and private social service providers' and their associations' web sites.

Electronic questionnaire was designed in a way that some questions were obligatory to answer in order to move forward on a questionnaire, but some questions could be skipped without answering. For this reason, all respondents did not answer to all questions. The online questionnaire service saved the unfinished drafts and completed questionnaires. The respondents were able to save their own answers from the online questionnaire service after submitting their questionnaires. The data from the online questionnaire service was imported to CVS files and into SPSS statistical program for examination and processing. Reminders for answering the survey were sent twice to the respondents. The respondents were motivated to answer also by phone calls.

After processing the data according to the exclusion criteria, the data contained 724 private social service providers, 99 municipalities and 19 joint municipal authorities, who were responsible for 45 municipalities' information management. The responses of public social welfare covered in total 144 municipalities (46% of all the municipalities) and 3,383,668 persons or 61.5% of the Finnish population.

In 2017 there were 3,971 units who were registered as private sector social service providers. In total 724 units provided responses that were accepted, making a response rate of 18.2%. Due to out-dated contact information from the register, the response rate remained fairly low.

Even though the response rate from the private organisations' side was still low, the response rates in general have increased: compared to 46% of municipalities and 18% of private organisations in 2017, the 2014 response rate covered 42% of the municipalities and 10% of the private recipients, and in 2010 the total response rate was only 23%.

The organisations which participated in the survey provide all statutory duties and functions of social services (Figure 3.1). Additionally, the geographic coverage of the survey was reasonable.

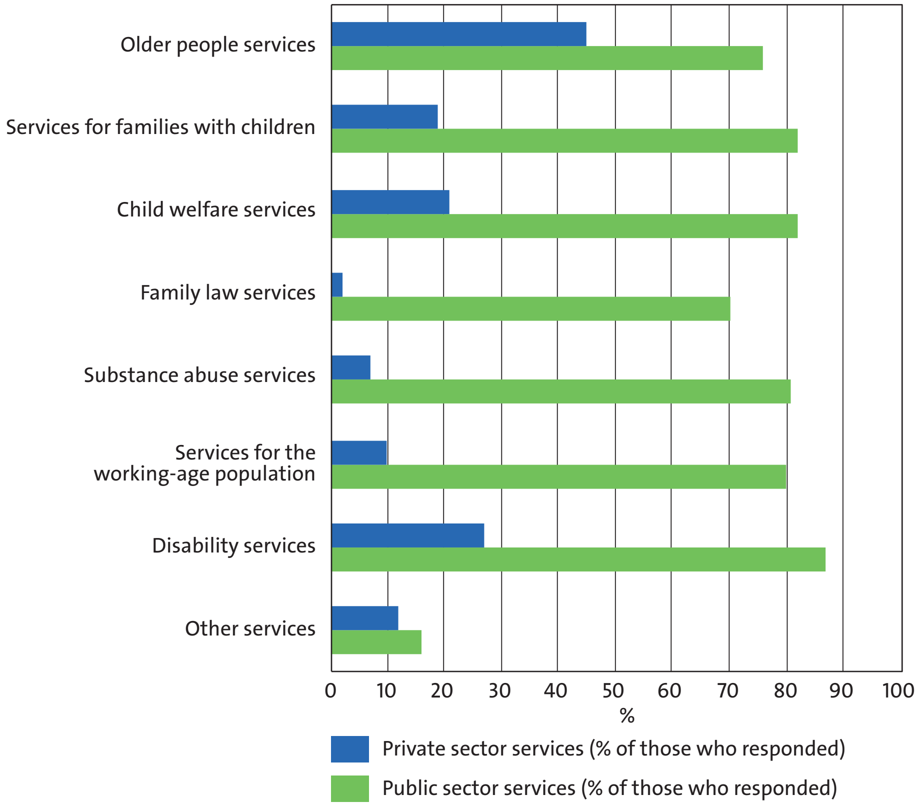

Figure 3.1. Social welfare services provided by the respondents.[12]

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[12] Social welfare services were classified according to the nationally validated social welfare services classification, which was established in 2016 by a THL specification. All classes include several subclasses of targeted social services and provision of support in everyday life. Since the classification changed after the 2014 survey, there is no comparison information available.

3.2 Client information systems (CIS) in social welfare

One of the main objectives of the Strategy is to provide smart systems for capable users, and one of the Strategy's intermediate objectives is that healthcare and social welfare professionals have information systems that support their work and its operating processes, in use. Professionals are involved in the procurement of the information systems and operation models. Professional's competence on information management will be strengthened and workplace training will be provided for new applications concerning both information systems and operating models (Ministry of Social Affairs and Health, 2014).

This part of the Strategy was measured with nine questions: six questions measured the availability of the systems for professionals and three questions measured the decision-making support for professionals.

In the public social services most of the service providers have a CIS for the different services. The most common CIS were Pro Consona and Effica (Figure 3.2). These were also the most often used CIS in 2011 (Kärki et al., 2012) and in 2014 (Kärki, Ryhänen, 2015). In private sector, Hilkka was the most common CIS. Lack of CIS was quite common in private sector, less so in the public sector. Only in family law services 13% of public service providers lacked CIS. For provision of most of the social care services in both sectors, there were many different CIS in use in Finland.

Only about 60% of private service organisations have a CIS for different social services. Big variety of CIS for provision of different services as well as the lack of CIS in small private organisations is challenging for comprehensiveness of client information in the Kanta services. Unified information architecture and technical and semantic interoperability is required for seamless information flow between multiple systems.

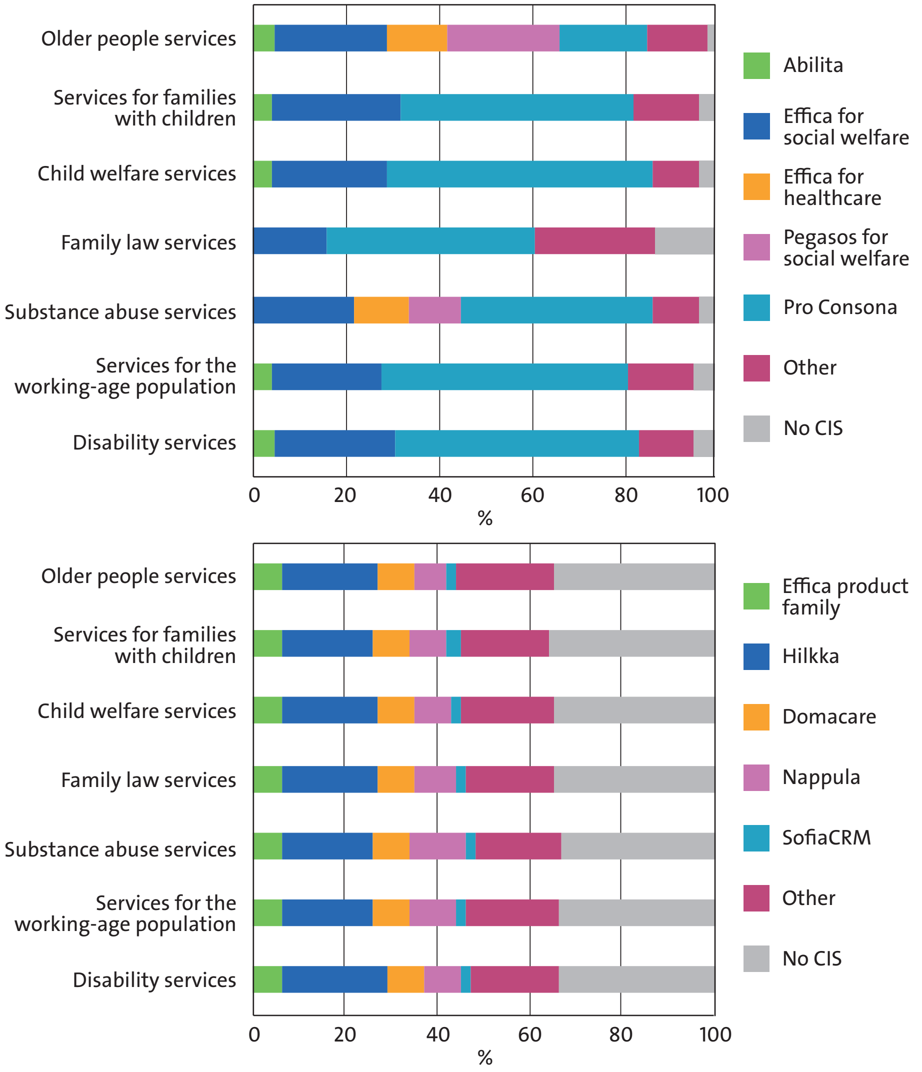

Figure 3.2. CIS in use in Public (above) and private (below) social welfare services.

Most (87%) of public social care organisations used username and password as means of identification to access the client information system. The situation has remained relatively similar compared to the 2014 survey (Kärki, Ryhänen, 2015). Also in private organisations providing social care services, username or password or their combination was the primary means of identification, but the user percentage was low. Over two thirds of organisations had no identification method in use, and the situation has polarized since 2014 between zero and 100 percent identification option.

Access to CIS is one prerequisite for electronic documentation of client data. Another prerequisite is the ability to use the system. One third of public sector organisations and half of private sector organisations informed that all of the social care personnel master the required data management skills, but counting in classes 'all' and 'majority' gives rather similar result for both sectors (Figure 3.3).

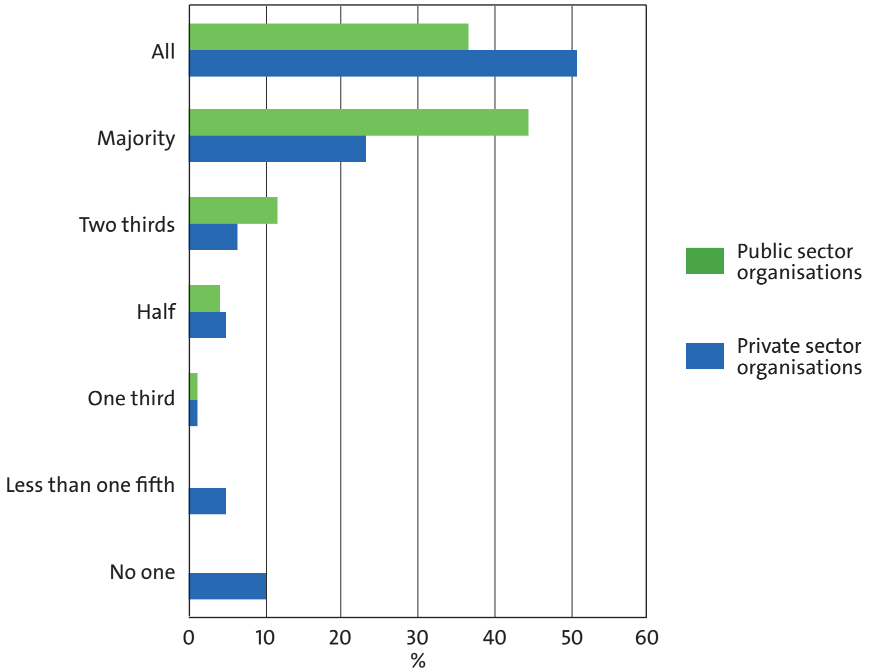

Figure 3.3. Proportion of personnel mastering basic skills required for electronic data management.

None of the public organisations but 10% of private organisations informed that nobody masters the basic data management skills. This is understandable, since many of the private social care organisations are very small, employing only one or a few persons, or there is no CIS in use (cf. figures 3.2 and 3.4).

A third prerequisite for collating comprehensive client information into Kanta services is that client data is actually documented into the electronic client systems (Figure 3.4).

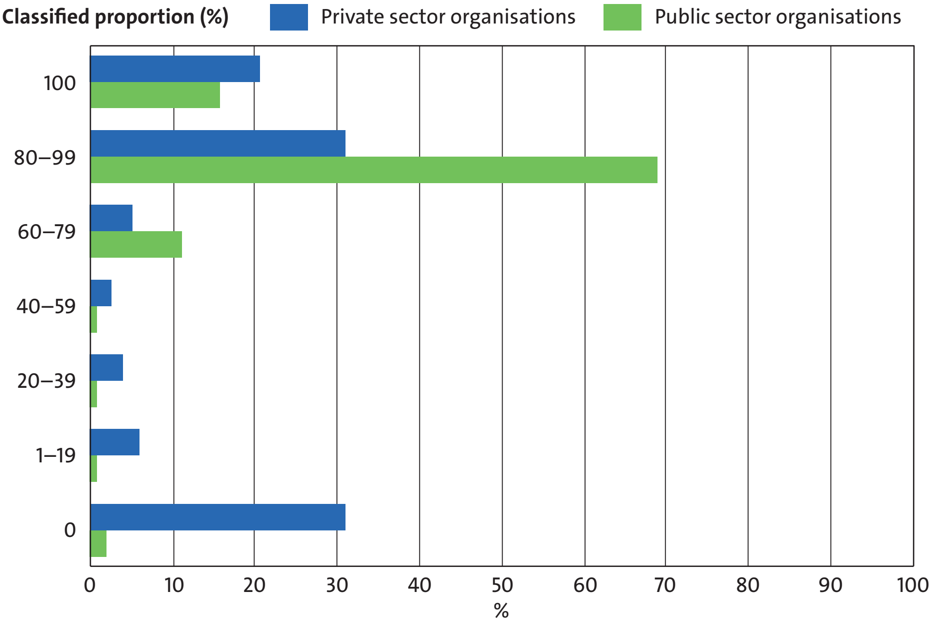

Figure 3.4. Proportion of client documentation that is stored in electronic format in different social care organisations.

The proportion of documentation stored electronically in the CIS in public and private sectors has remained similar to 2014. Over four out of five of public organisations and half of private organisations document 80% or more of their client data in electronic format. However, over 30% of private social care organisations did not document any of their client data in electronic format in 2017, and also a few public organisations informed not documenting any client data electronically.

3.3 Information exchange in social welfare

One objective of the Strategy explores social welfare and healthcare information management from the service system perspective. In order to effectively utilize limited resources, the strategic objective is to have client's information accessible for professionals and clients irrespective of organisational, service or information system changes. Electronic information management solutions also increase the effectiveness and impact of the service system. Focal intermediate objectives target healthcare and social welfare information exchange across sectoral boundaries and further, to national data protection solutions which facilitate solutions where physical services requiring appropriate facilities and a large number of staff can be replaced by lighter online services where appropriate (Ministry of Social Affairs and Health, 2014). Six questions that measured availability of information were grouped under this part of the Strategy. Further, five questions regarding information management expenses and joining Kanta services were also included.

3.3.1 Information exchange between systems

Workers in social welfare often need information from different sources at their work with clients. There have been solutions for workers to gain a limited access to information from other organisations' records. In 2011, information exchange in public sector was still mainly viewing rights and electronic information transfer between information systems was limited (Kärki et al., 2012). In 2014 the proportion had reached over 40% (Kärki, Ryhänen, 2015). In 2017 42% of the public sector organisations and 12% of private sector organisations had organized electronic information transfer from client information system to the information system of another organisation.

In 2014, 30% of the public social welfare and 10% of private organisations had arranged viewing rights for other organisations. However, in 2017 this number had risen up to 49% in public sector but remained almost the same in private sector.

Respondents from public sector were asked to which information systems from other organisations they had access to (Figure 3.5). The National population register administered by The Population Register Centre, Social Insurance Institution´s (SII, Kela) SOKY-system and municipality's financial or payment system was used in all social services. Ministry of Employment and the Economy (TEM) administers TYPPI and URA systems, which were used in Public employment and business services (TE Offices) and Labour Force Service Centres for employing long-term unemployed persons. The use of other information systems varied a lot and they were used according to the specific goals of the service.

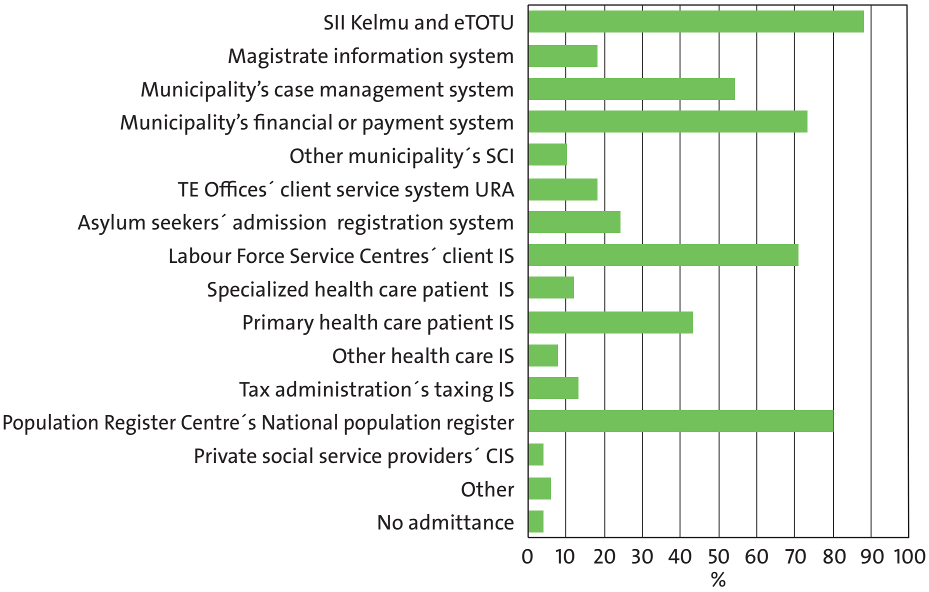

Figure 3.5. Public organisations that can be accessed via the CIS in municipal social services.

The situation has remained relatively constant since 2014: In 2017, Kela systems Kelmu and eTotu as well as the national population register, administered by The Population Register Centre, were the most common other systems, which municipal CIS provided access to. Kelmu is the digital benefit information system for social services workers, where workers can view benefits that are pending, decisions about payments and payment information. This information is needed for managing social welfare duties such as defining client fees. It is also possible to register demands for Kela's benefit payments via Kelmu service. eTotu is the digital service for applying basic financial support granted by Kela. Announcements of immigrants and of persons who are unemployed and under 25-years-old can also be forwarded via eTotu if their main source of income during the review period has been social assistance.

Access to municipality's financial or payment system and to TE offices' TYPPI system was also quite common. More than half of the respondents from public sector were able to access to municipality's case management system and more than third were able to access primary healthcare electronic medical records. Hardly any municipal CIS provided access to private service providers CIS, although they could care for the same client. The question did not specify whether the access was a viewing right or automatic information transfer to social welfare's CIS. Of the responses for open-ended question regarding the most important development needs on information exchange, majority focused on information exchange development or integration between CIS, between CIS and EPR or between different organisations.

3.3.2 Social care organisations joining the Kanta archive

Developing Kanta services in social care is an implementation project on national information system services and standardized documentation in social welfare services. Kanta services that will be used in social welfare are Social care data archive and citizens' web service My Kanta Pages.

Client data archive for social welfare services is a national information system that enables centralized archiving of electronic client data of social welfare services, active use of information and permanent storage of data. The service is possible to be implemented for all service providers of social welfare who store electronic client documents. The archive is used with social welfare CIS and the use of the system requires a customership of Kanta services. Client data archive was launched in 2018. It will be used in both private and public social services.

My Kanta Pages is a service for citizens to view their own social welfare records and for electronic use of services. Client will be able to view his/her own records from My Kanta Pages in 2020 when organisations put the service into operation.

Implementation of the service will be carried out in phases. Between 2018 and 2020, it is possible to implement the functionalities of phase 1: archiving old records or records that have been created after the implementation into a personal use of the registrar.

During 2020 new functionalities that will be implemented are electronic signature, so-called group clientee and standardised client documentation. In addition, client data archive for social welfare enables transferring documents, informing the client, management of consents and prohibition to transfer data as if it will be legislated in the Act on the Electronic Processing of Client Data in Healthcare and Social Welfare (159/2007).

Kanta social care client data archiving implementation started from public sector organisations. In a survey made in 2017 (Luoma et al., 2017) out of the 126 organisations who responded, slightly more than half of the organisations were planning to join the Kanta services in phase 1 but only every 20th organisation had made a decision about joining. By the end of 2018, three joint municipalities, two municipalities and one association had joined Kanta services for social welfare.

In our survey directed to private sector organisations questions regarding plans to join into Kanta client data archive in phase 1 was asked. Only few respondents had made the decision to join the archive, but approximately 20% of all respondents reported to have at least discussed about joining the archive (Figure 3.6). One fifth of the respondents were not aware of the situation regarding Kanta implementation in their organisation.

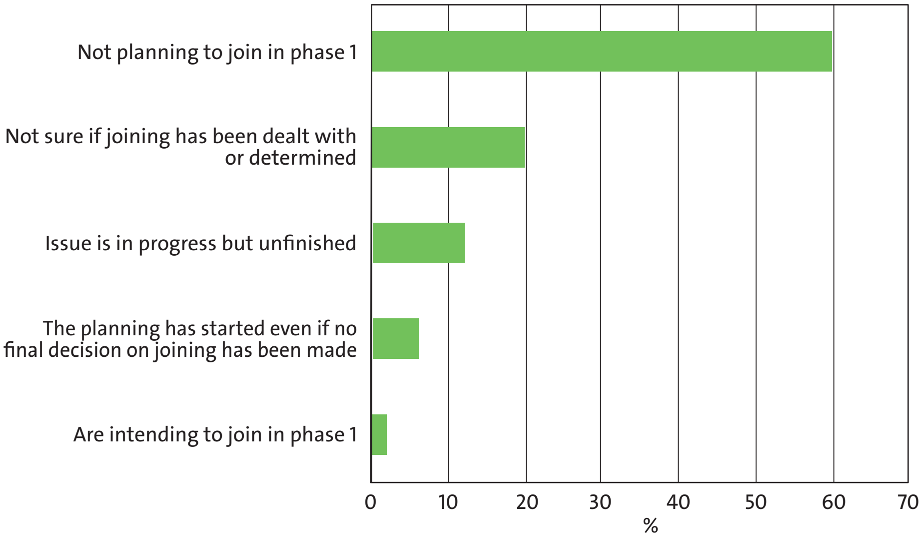

Figure 3.6. Proportion of private care organisations planning to join the social care Kanta archive in phase 1.

3.3.3 Human and material resources

In those municipalities that responded to the survey, there were approximately 54,800 persons who worked in social services. Number of personnel varied from 1.8 workers in small public sector units to 15,700 in one city. More than two thirds of the respondents in the public sector claimed that number of personnel in their organisations was at most 200. On average there were 480 social service workers in the public sector organisations, median being 100 workers.

In total, 25,300 persons reported to work in private sector (respondent) organisations. In the majority of the private sector organisations (44.6%) the number of personnel was from two to ten workers but nearly in a fifth (17.5%) of the organisations there were no more than one full-time worker. More than 90% of the respondent organisations had employed at most 50 workers.

Material resources were surveyed by financial dimension. The investment costs of CIS in 2014, 2015, and 2016 (Figure 3.7), indicate that investments in the public sector varied, like previously, between the lowest and the highest category. From 2014 to 2016, the proportion of those who invested less than EUR 50,000 a year on information management decreased and a proportion of those who invested between EUR 50,000 to 500,000 a year were seen to increase slightly. In a private sector investments were mainly low and did not increase during mandate period. According to the results of this report, and previous ones (Kärki et al., 2012; Kärki, Ryhänen, 2015), public sector invests more on ICT compared to private sector and the variation in costs between organisations has not decreased during the years.

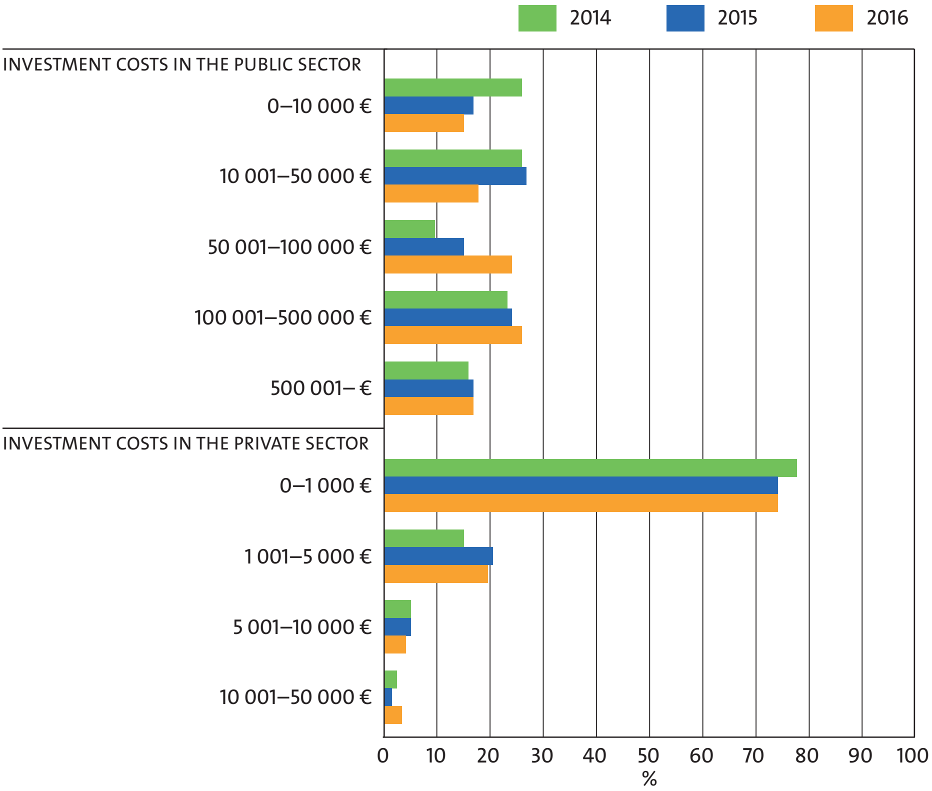

Figure 3.7. The change in a yearly ICT-investments (% of the respondents) in social service organisations between 2014 to 2016.

According to earlier reports (Kärki et al., 2012; Kärki, Ryhänen, 2015) , total ICT costs had increased only slightly but they were expected to increase; only very few believed that they might decrease. Also in 2017, very few organisations believed that ICT investments might decrease between 2017 and 2019 (Figure 3.8). In the public sector most of the respondents believed that costs will continue to increase every year whereas, in the private sector approximately half believed that costs will increase every year and the other half believed that costs will remain at a current level.

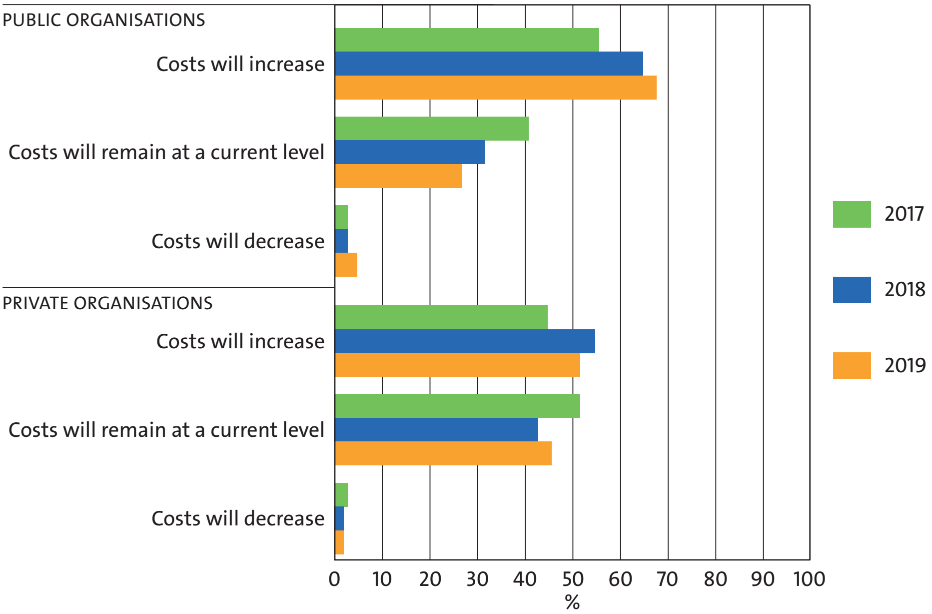

Figure 3.8. An estimate of social service organisations' total ICT costs development between 2017 and 2019.

Response rate in private organisations was low, only under one fifth of all organisations answered to this question. It can be assumed that there is uncertainty about Kanta services solution´s impact on cooperation between public and private organisations. This uncertainty can be seen also in figure 3.6.

3.4 Availability of digital social services for citizens

One of the core aspects in the Strategy is about citizen and their possibilities to use electronic services. Another aspect is utilisation of data that citizens produce in the service production. The objective is that a citizen uses e-services and produces data for themselves and for professionals to use. According to the Strategy this requires that reliable well-being information and the services that support it, are achievable and that the quality and availability information is nationally available (Ministry of Social Affairs and Health, 2014).

In a survey directed to social welfare organisations, electronic social services for citizens were examined with two questions: by mapping to which degree organisations provide generic (no user identification needed) electronic services for citizens and on the contrary, to which degree they provide targeted (user identification needed) services.

Services with no user identification were more often provided by public sector social welfare units than private sector units (Figure 3.9) – unlike in healthcare where private sector is a forerunner in providing e-health services for citizens.

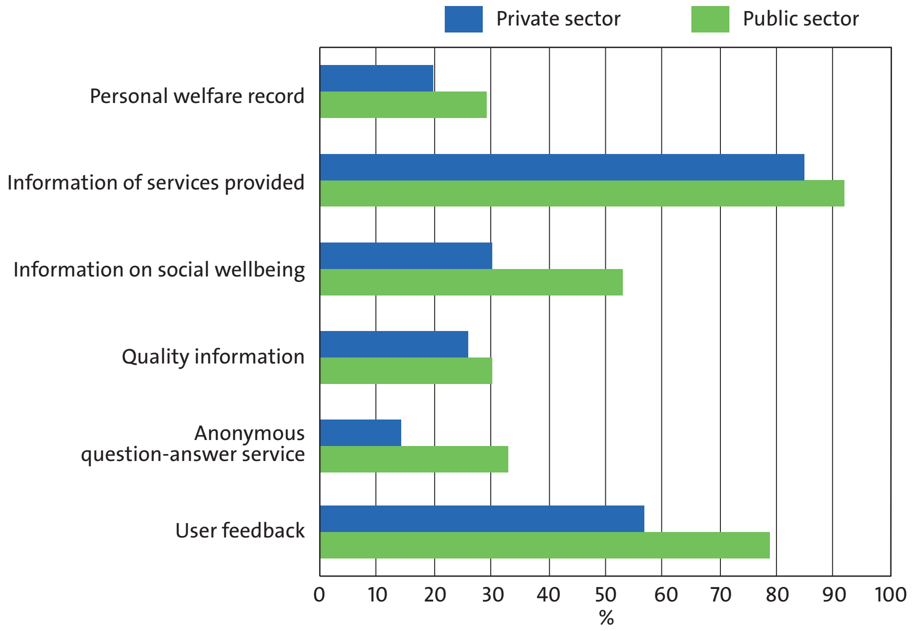

Figure 3.9. General electronic services for citizens produced by the organisations.

The most common electronic service was information of the services provided in the organisation, as also in 2014. The possibility for a client to give feedback online had become more common compared to 2014 when it was available in 47% of the public sector organisations. General information on social wellbeing was provided in more than half of the public sector and in third of the private sector organisations. The situation had remained the same compared to the survey in 2014 (Kärki, Ryhänen, 2015).

Also targeted e-services were more common in the public sector social service organisations compared to private sector (Figure 3.10). Videoconferencing and other remote services were the most commonly provided real time services from the public sector organisations (47%). Here the difference between healthcare was major, since in healthcare, remote services were not amongst the most common e-services. Videoconferencing and other remote services were provided more compared to 2014 when approximately third of the respondents reported to provide this service.

In the private sector the most common e-service was electronic application for services which was the second most common e-service in the public sector. The proportion of it had not increased during the mandate period. The third most common e-services in the public sector organisations was self-evaluation tool/benefit calculator which had increased from 15% to 30%.

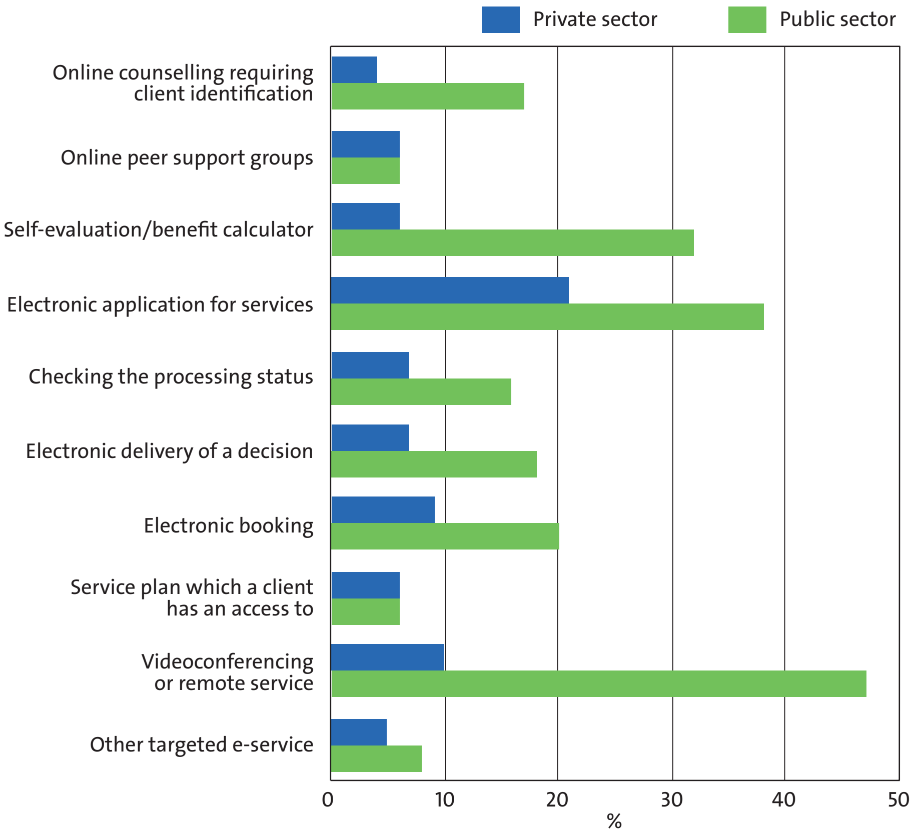

Figure 3.10. Targeted electronic service provision for citizens and clients in social service organisations.

The possibilities for checking the processing status, delivery of a decision and electronic booking increased only a few percentages in public sector during three years. However, no significant increase was detected in the provision of electronic services for citizens and clients.

3.5 Management and data safeguarding in social care

The Strategy aims that data sets would support management of service production, decision-making, research and innovation and industrial activities. The objective is that client or patient specific data generated in healthcare and social welfare, information on availability, quality and cost-effectiveness, information that is produced by the citizens and information that is generated on other sectors are available for supporting the management (Ministry of Social Affairs and Health, 2014).

Management and the information related to it can be examined through different viewpoints: professionals' self-management on micro level, unit management on meso level and national management on macro level. On micro level, nearly all professional groups who work with clients make decisions that should be based on the information obtained from the clients, services provided and the operational environment. Case management system (CMS) is one tool for the management of professionals' own work. In a survey for social services, questions regarding availability of CMS were asked. Electronic CMS supports for example digital process of applications and their attachments and their delivery to those actors who have the capacity and/or special expertise on solving the matters at issue. Of the public sector organisations, 75% had CMS in use. Only 16% of the respondents from the private sector reported to have CMS. In the open-ended questions the respondents also mentioned to have statistical and quality control programs and other tailored applications. In some cases the municipality that conducted purchases from the private providers was in charge of the case management.

Another objective in the Strategy is to promote interoperability on the macro level with information management steering, leadership and cooperation. The systematic development of information management's cooperation structures started in the Tikesos project in the mid-2000s' and the development has remained systematic ever since. However, even the best models do not benefit the clients if they have not been implemented in the organisations that provide services. The frequencies of actions related to this part of the Strategy that were examined in the survey are presented in figure 3.11. The most common actions were formulation of data security and data protection instructions: instructions were made in 81% of the public sector organisations and in 62% of the private sector organisations. The most common action in the private sector (69%) was formulation of In-house control defined in the Act on the Electronic Processing of Client Data in Healthcare and Social Welfare (159/2007). In the public sector it was formulated by 50% of the organisations. Enterprise architecture description standardized in Information Management Act (634/2011) was missing from the major part of the private sector organisations and slightly less than half of the public sector organisations. Furthermore, Digital archiving plan eAMS and Information management strategy were much rarely formulated in the private sector organisations compared to public sector.

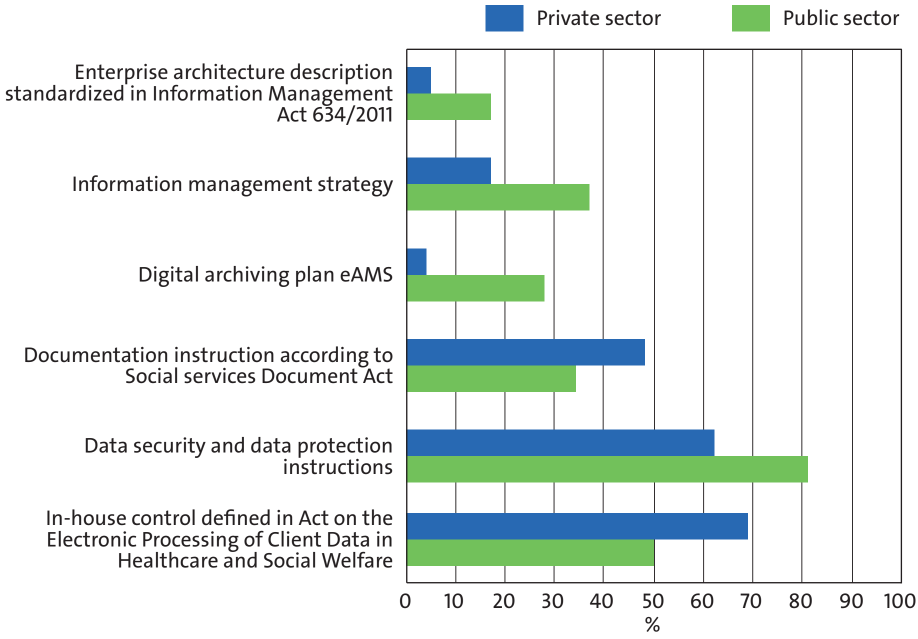

Figure 3.11. Information management, architecture and collaboration in social service organisations.

In addition, one half of both public and private organisations had produced task-specific service process descriptions, and 28% of public, but less than one percent of private organisations had participated in efforts to specify a regional enterprise architecture.

These questions are not comparable to the previous surveys. Enterprise architecture descriptions have become more common only after forcing the Information Management Act (634/2011) and steering related to it and Act on Client documentation in Social Care (254/2015) which was forced partly not until 2016.

3.6 Standards and infostructure in social welfare

The Strategy also emphasizes functioning infostructure that includes content and technical standards and definitions that support information dissemination and interoperability (Ministry of Social Affairs and Health, 2014). This objective of the Strategy was examined from information and information management structures' and information technology's viewpoints. There were three questions related to this part of the Strategy.

Use of national document definitions in social care documents (Figure 3.12) had proceed in a way that 56% of public organisations used national document definitions in documents related to the rights of a child and child welfare. It is possible that the results are explained by comprehensive legislation related to child welfare that these preparations support. In the public sector, child welfare services are using definitions the most often.

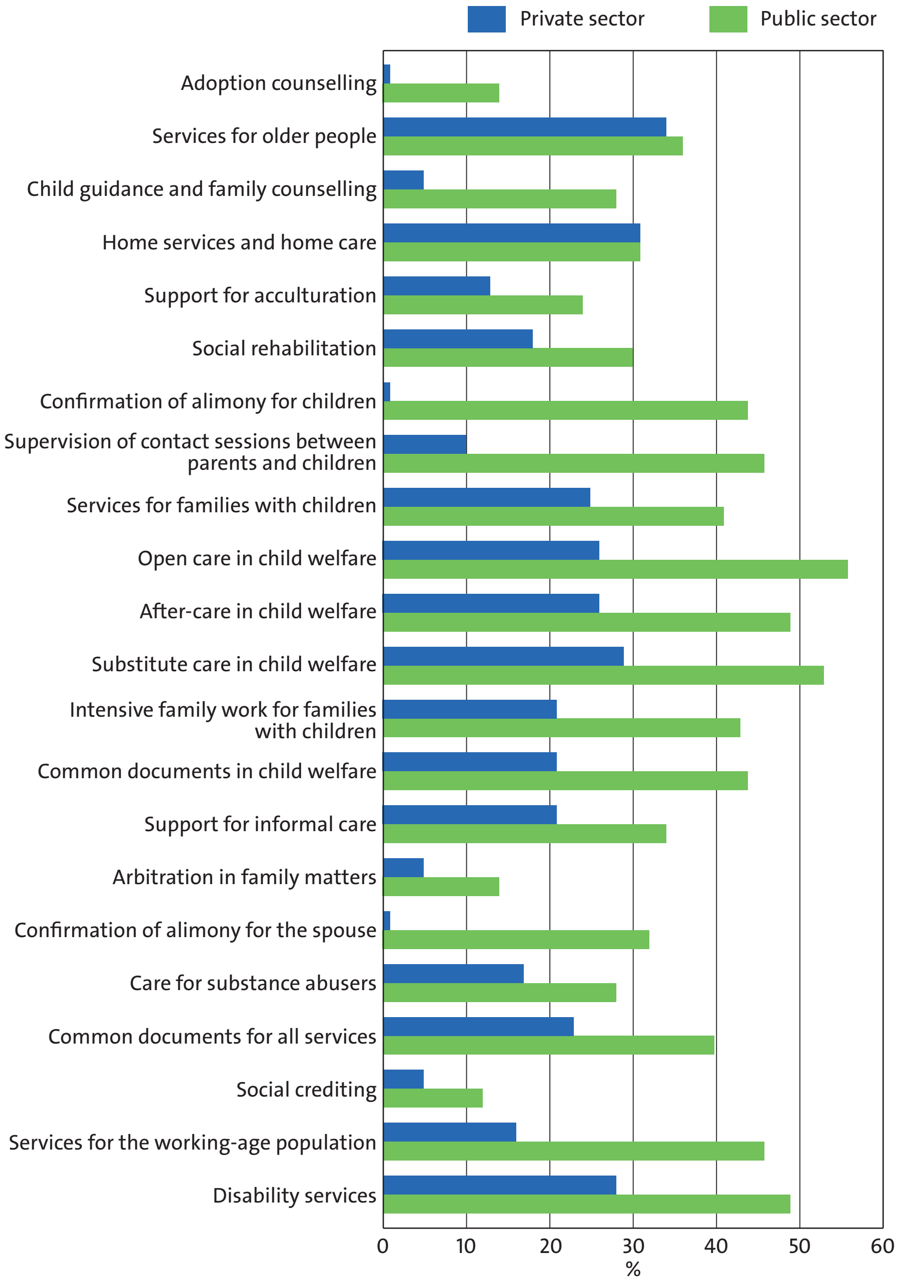

Figure 3.12. Use of national document definitions in public social services documents[13].

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[13] For general social services under Social Welfare Act, see: https://stm.fi/en/social-serviceshttps://stm.fi/en/social-services. Moreover, there is a wide range of specific acts and decrees to define special social services for children, disabled, older people, substance abusers, family work, etc.

This classification of services differs from the official THL standardized specification (National Institute for Health and Welfare, Information services department. Operational management unit, 2016) as presented in figures 3.1 and 3.2. It reflects the former, more detailed list of services. Some of the classes, like services for working-age population and substance abusers, have remained same in the new specification, but especially in children's services there was a need for more precise description of national document definitions in use for specially targeted services, as explained above. However, it has to be noted that this list is not complete and does not cover all services organisations offer; for example, financial and debt counselling, not mentioned on the list, is given by several organisations.

In public sector, services for older people (services for older persons, home services and support for informal care) were unexpectedly a group for which definitions were used relatively little. In private sector, documents related to services for older persons and home services were the most common services using common definitions. Definitions relevant to other client groups were most commonly used in services for the disabled in public and private sector, and in services for working age people in the public sector.

There is no direct comparative information from the previous surveys regarding the frequency of the classification since the classification changed from that used in 2014.

Apart from common document definitions, common classifications for social services have been developed. More than one half of public and a quarter of private sector respondents used a classification of social services (Figure 3.13).

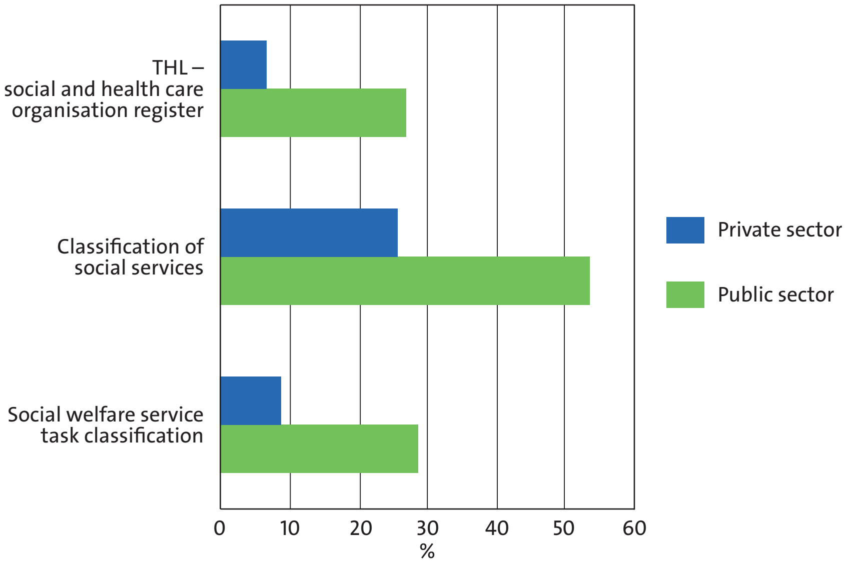

Figure 3.13. Proportion of organisations using social care classifications in public and private sector.

Fewer than one out of three of public organisations and 7% of private sector respondents used a social and healthcare organisation register and a social welfare service task classification.

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Legislation:

Act on Client documentation in Social Care (254/2015)

Act on the Electronic Processing of Client Data in Healthcare and Social Welfare (159/2007).

Information Management Act (634/2011)

4 Physicians' experiences of health information systems

4.1 Structure of the 2017 survey and comparison to earlier surveys

Peppiina Saastamoinen

The third survey of physicians' experiences on electronic patient records (EPR's) and related e-services was conducted in 2017. As previous surveys in 2010 and 2014, it was targeted to all working age physicians in clinical work in Finland. The survey was carried out in collaboration with Finnish Medical Association, National Institute for Health and Welfare (THL), Oulu University and Aalto University. All together 4,018 physicians responded to the survey. Corresponding figures in 2010 and in 2014 were 3,929 and 3,781 (Table 4.1).

Table 4.1. Demographic information of the physician survey respondents in 2010, 2014 and 2017.

	2010	2014	2017
N	14,411	16,350	17,210
Respondents	3,929	3,781	4,018
Working sector			
Public hospital	1,950	1,856	1,943
Public healthcare centre	919	926	1,070
Private sector	587	604	665
Other	473	395	340

The results of 2010 and 2014 surveys have been published in several national and international papers, reports and proceedings (e.g. Viitanen et al. 2011; Martikainen et al. 2012; Hyppönen et al. 2014; Vainiomäki et al. 2014; Kaipio, et al. 2017). In addition, the results of the 2010 and 2014 surveys are summarized in the previous e-health and e-welfare of Finland check point reports (Hämäläinen et al. 2011; Hyppönen et al. 2015). The results of the third survey are summarized in this report. Additional publications of the 2017 survey include e.g. basic reports (Saastamoinen et al. 2018 (in Finnish), Metsäniemi et al. 2018 (in Finnish)), a questionnaire validation study (Hyppönen et al. 2019a) and a study on health information exchange (Hyppönen et al. 2019b). All three surveys were utilized in a study on physicians' experiences on usability over time (Kaipio et al. 2019).

The target groups for all three surveys were selected from the membership register of the Finnish Medical Association (FMA, over 90% of physicians are members of FMA). The applied criteria were: certificated physician, age under 65 years, and living in Finland. Information on clinical work status was no longer included in the register in 2014 and 2017, and thus the amount of physicians doing clinical work (original target group) is an estimation based on several data sources and expertise of the researchers of Finish Medical Association. According to our analyses the respondents represent the target group reasonably well. However, older physicians, women and those having specialized, respondent somewhat more actively than younger physicians, men and those who were not specialized.

The survey questionnaire 2017 is available in English (Finnish Medical Association, 2017). The method of generating the 2010 questionnaire has been reported elsewhere (Viitanen et al. 2011).

The survey has several topics including e.g. technical features, ease of use, patient safety, intra-organisational and cross-organisational collaboration, support for work, important areas for development, best functionalities and overall satisfaction score, in addition to background information. The questionnaire has remained mostly unchanged. In addition, each year a selected special topic has been covered. In 2017, the special focus was on intensive care unit electronic patient record systems. In 2014, the focus was on patient safety and management information systems and in 2010 on e-health related wellbeing at work and participation in e-health development.

A validation study of the questionnaire (National usability focused HIS-scale, NuHISS) was conducted in 2018 using data from both the 2014 and 2017 surveys. The validity of the questionnaire proved to be acceptable. A factor analysis revealed seven dimensions, which were named: Technical quality, Information quality, Feedback, Ease of use, Benefits, Internal collaboration, and Cross-organisational collaboration (Hyppönen et al. 2019a). Thus, the questionnaire suits well to assess the usability of health information systems among physicians, but the national health policy goals need to be considered when selecting questions/ using questionnaire.

Apart from chapters 4.6 and 4.7, the analyses in this report are based on THL Data base report (2019). Responses were grouped according to the sector (hospital, public health care, private sector) and the working sector and year were used as grouping variables for the measures. Measures depict proportion of physicians fully agreeing or somewhat agreeing with the claims. The database uses full data from each year, whereby proportions may slightly differ compared to earlier reports (e.g. Saastamoinen et al. 2018; Hyppönen et al. 2019a, b) that have used different filters.

4.2 Usability of electronic patient record (EPR) systems

Johanna Kaipio

Usability lies in the interaction of the user and the information system. By definition, usability refers to the extent to which a system can be used by the user to achieve one's goals with effectiveness, efficiency and satisfaction in the context of use (ISO 9241-11, 1998). In health informatics field, usability of clinical information systems may be seen to reflect the ability of the systems to have a positive impact on patient care by supporting physicians in achieving their goals with a pleasant user experience (Kaipio et al., 2017). This includes the requirement for the systems to include intuitive user interfaces, to support the efficient use of the systems, as well as to provide the key context-matching functionalities for the physicians.

This section presents results related to the physicians' overall satisfaction with their electronic patient record (EPR) systems based on data gathered in 2017. In addition, we report physicians' experiences on use and usability of the systems with regards to ease of use and technical quality. These results are based on data from the three studies conducted in 2010, 2014 and 2017.

4.2.1 Overall satisfaction by healthcare sector

The physicians were asked to assess their principal EPR system with a school grade in a scale from 4 to 10 (4 = fail, 5–6 = poor, 7–8 = fair, 9–10 = good). Figure 4.2.1 illustrates the summary of grades by presenting the portion of grades 8 and higher (9 and 10) by healthcare sector.

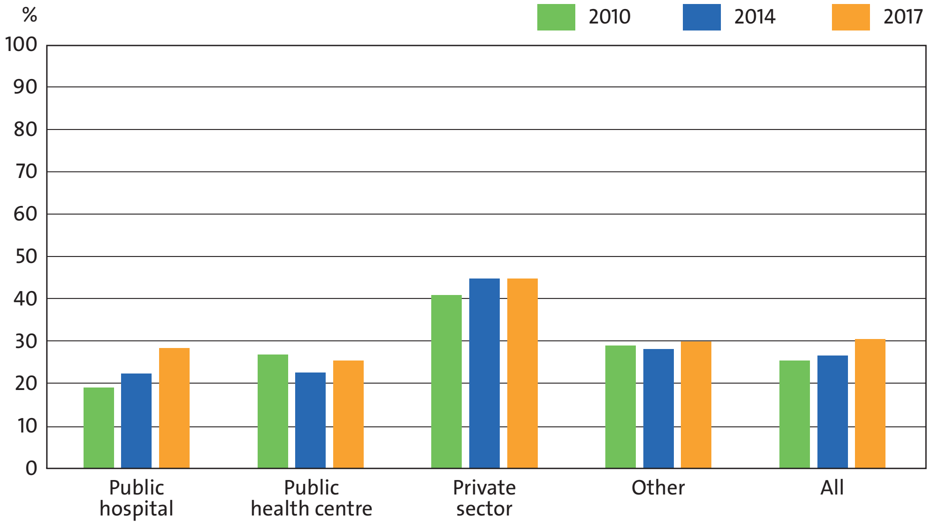


Figure 4.2.1. Overall satisfaction: School grades 8 and higher given by physicians to their principally used EPR system.

The private sector EPR systems scored better compared to EPRs used in public hospitals and public healthcare centres. Based on the results the overall satisfaction of physicians has slightly improved between 2010 and 2017 in public hospitals and in private sector. Overall, good grades were still rare in 2017: less than 30% of physicians working in public sector (28% in public hospitals and 25% in public healthcare centres) and 44% of their colleagues in private sector gave school grade 8 or higher for their principally used EPR system.

4.2.2 Ease of use

Several statements in the usability-focused survey assessed the ease of use of the EPR systems (Hyppönen et al., 2019a). These items were related user interface characteristics, system's abilities to support the users in their routine tasks, as well as key functionalities of the EPR system, including reading, documenting and retrieving patient data. For the analysis, the five-point Likert scale answers 'Fully agree' and 'Somewhat agree' were combined to form the category 'Agree'.

Concerning the statements about user interface characteristics – logical arrangement of the field and functions in the screen as well as how clear and understandable the terminology on the screen is – the responses indicate slight improvement in public hospitals but change for the worse in other sectors between the years 2010 and 2017 (Figure 4.2.2). Physicians in private sector seem to be more satisfied with the user interface characteristics of their EPR systems compared to their colleagues in other sectors.

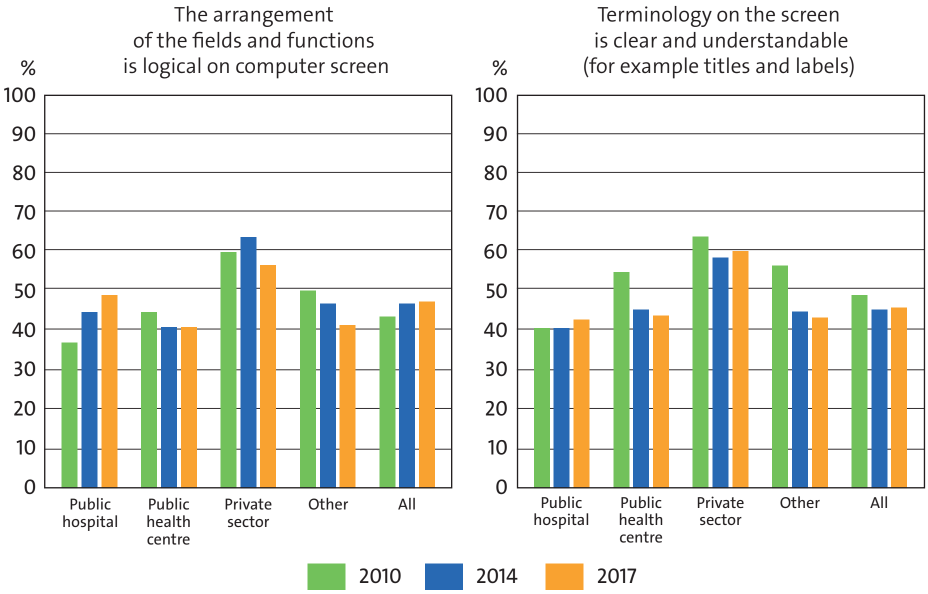


Figure 4.2.2. Proportion of physicians agreeing with the statements concerning the arrangement of the fields and functionalities and terminology.

In public hospitals the proportion of physicians agreeing with the statement 'Routine tasks can be performed in a straight forward manner without the need for extra steps using the systems' is about 30% in year 2017 and there does not seem to be notable changes between the years 2010 and 2017 (Figure 4.2.3). Instead, responses from other sectors show change for the worse: the proportion of respondents agreeing with the statements has decreased about 13% between years 2010 and 2017. Looking at the results, only one fourth of physicians in public healthcare centres and less than half in private sector (47%) and less than one third in public hospitals (30%) and other sector (30%) agree with the statement about their EPR system's abilities to support physicians' routine tasks.

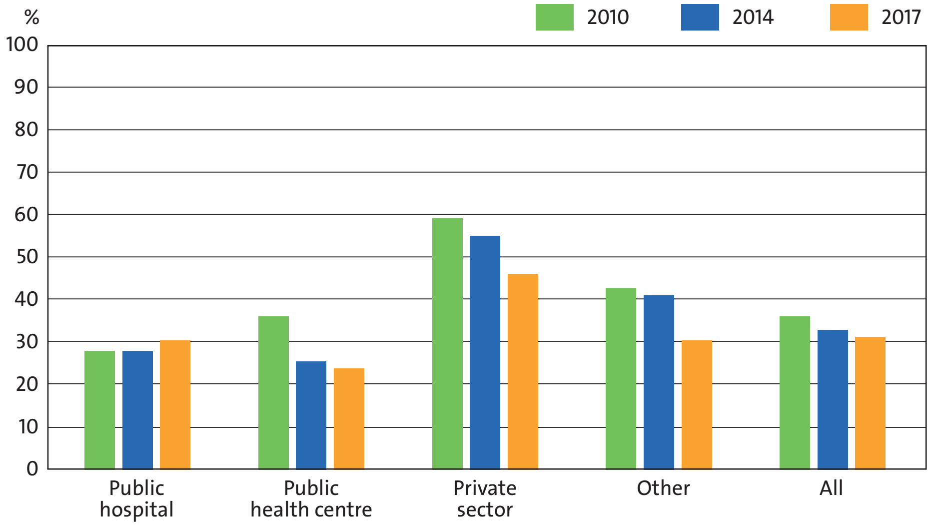


Figure 4.2.3. Proportion of physicians agreeing with the statement that routine tasks can be performed in a straight forward manner without the need for extra steps using the systems.

Results concerning physicians' experiences on managing patient data using their EPR systems are based on data from the surveys conducted in 2014 and 2017 (Figure 4.2.4). Concerning the other statement 'Entering and documenting patient data is quick, easy and smooth' the proportion of respondents agreeing show similar pattern to other ease of use related statements: Physicians in private sector are more satisfied with their EPR systems than their colleagues in other sectors. However, between the years 2014 and 2017 the results indicate slight improvement in the public sector.

Difference between results reported earlier was that the proportion of physicians agreeing with the statement about ease of obtaining patient data was about the same in public hospitals and private sector. In public hospitals, the proportion of physicians agreeing with the statement shows slight improvement, whereas in other sectors an increase in dissatisfaction was seen between the years 2014 and 2017.

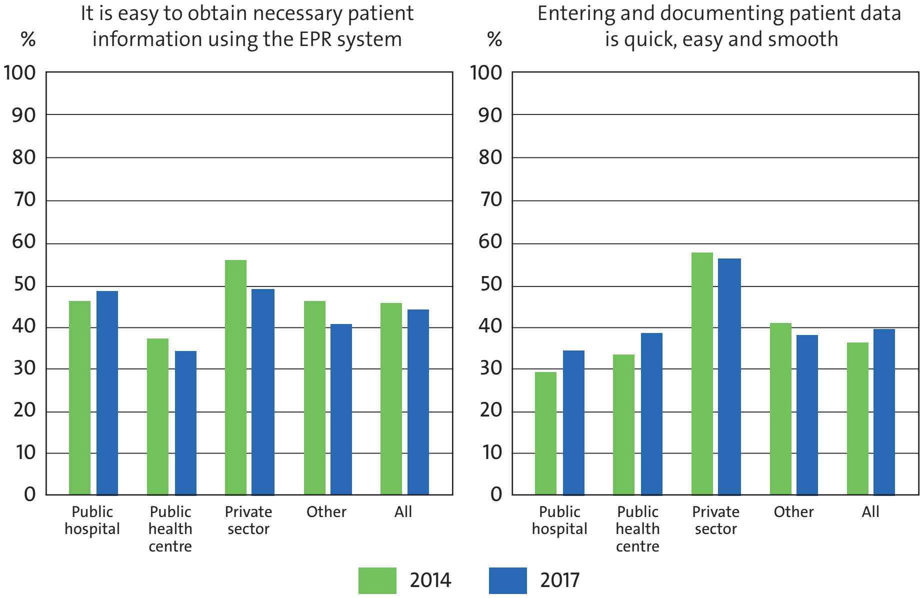


Figure 4.2.4. Proportion of physicians agreeing with the statements about obtaining patient information and entering and documenting patient data.

Technical quality

A group of statements in the survey assessed technical quality of EPR systems. These items were to measure reliability and safety aspects of EPR system (Hyppönen et al., 2019). For the analysis, the five-point Likert scale answers 'Fully agree' and 'Somewhat agree' were combined to form the category 'Agree'.

Physicians responses to statements 'The systems responds quickly to inputs' and 'The system is stable in terms of technical functionality (does not crash, no downtime)' show similar patterns: Apart from public hospitals, the results show change for the worst, particularly in public healthcare centres (the proportion of agreeing physicians is less than 40% to both statements) (Figure 4.2.5). In public hospitals, the proportion of physicians agreeing with the statements in 2017 is about the same as it was in 2010. Again, the physicians in the private sector are more satisfied with their EPR systems concerning the technical reliability than physicians in other sectors.

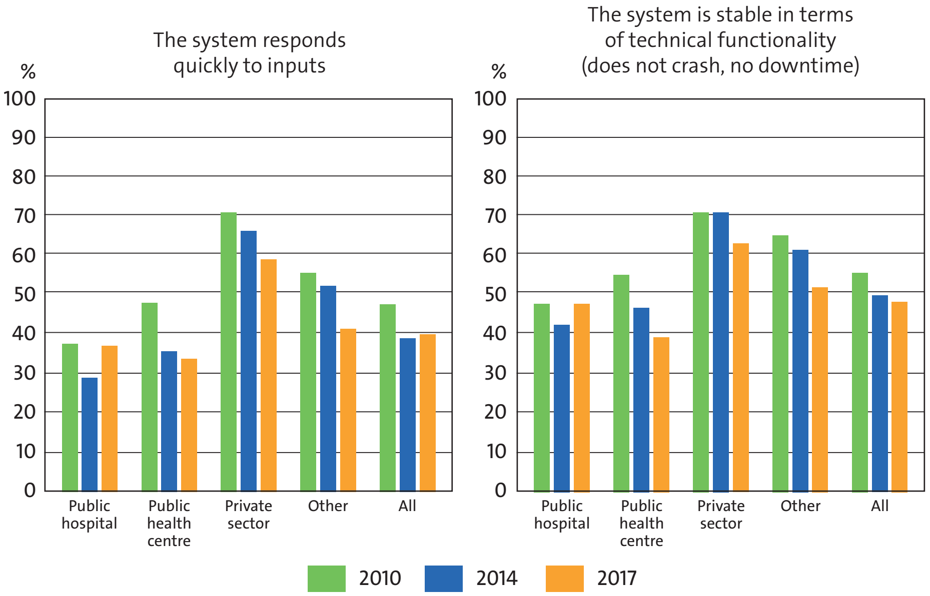


Figure 4.2.5. Proportion of physicians agreeing with the statements about the system responding quickly to inputs and the systems being stable in terms of technical functionality.

One statement of technical quality assessed the physicians' experiences on faulty systems function and the related effects on patient safety. In contrast to previous statements, this statement was negatively worded. Results show that in private sector 11,5% of the respondents agreed with the statement 'Faulty system function has caused of nearly caused a serious adverse event for the patient' whereas in public sector the corresponding proportion was more than one third of respondents (hospitals 37% and healthcare centres 37%) (Figure 4.2.6). Between 2010 and 2017 the situation has slightly improved in public hospitals whereas in public healthcare centres it has worsened. In year 2010 there was a significant difference between results from hospitals and healthcare centres (43% vs 28%), however, in year 2017 the proportion of physicians agreeing was about the same 37%.

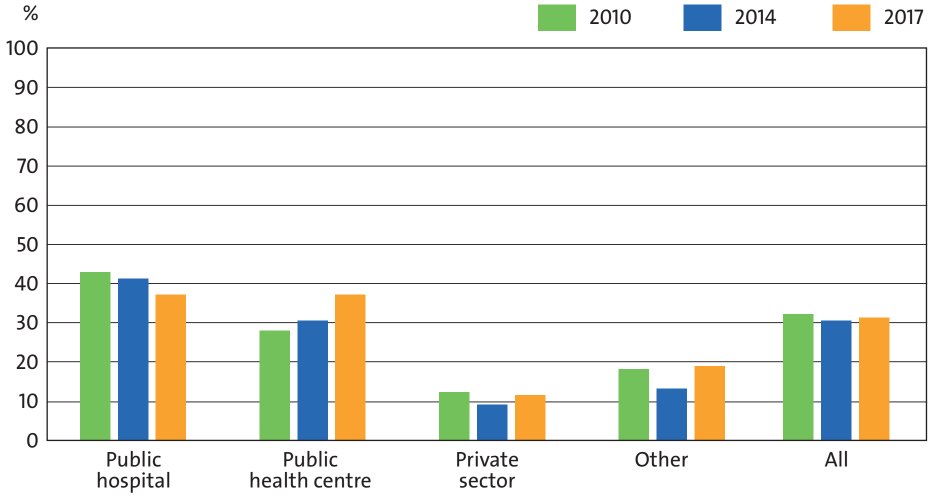


Figure 4.2.6. Proportion of physicians agreeing with statement that faulty system function has caused or has nearly caused a serious adverse event for the patient.

4.3 Usability of health information exchange and utility of systems

Hannele Hyppönen

Electronic Health Information Exchange (HIE) is the transfer of healthcare information electronically across organisations within a country, region or community. HIE provides the capability to electronically move clinical information among different healthcare information systems and provider (Wikipedia.org). HIE allows doctors, nurses, pharmacists, other healthcare providers and patients to appropriately access and securely share a patient's vital medical information electronically–improving the speed, quality, safety and cost of patient care (The Office of the National Coordinator for Health Information Technology, (ONC), 2018).

The national eHealth and eWelfare strategy objectives for 2020 emphasize professionals' and clients' access to client and patient information irrespective of changes in organisation structures, services and information systems. The national solutions are mentioned as key means for this, also accounting for the demands of data protection. The aim is that the HIE solutions increase the effectiveness and impact of the service system and secure the equal offering of services also in remote areas (Ministry of Social Affairs and Health, 2014).

In Finland, electronic HIE has been regionally supported in the public sector by five different regional health information systems (RHISs) for over 10 years. They have offered three different types of access patient information with patient consent across registrars, with minor changes in user organisations over the years. Private providers have no access to RHISs. National support for HIE began with e-prescription for professionals and My Kanta Pages for citizens in 2011. In 2014, the services were fully implemented in the public sector, and being implemented in private provider systems. National Patient Data Repository (Kanta) implementation started in 2014, and with it, contents of My Kanta Pages increased from prescriptions and dispensing information to own medical record data. By 2017 Kanta was fully implemented in the public sector, and private sector implementations were on the way (Hyppönen et al., 2019). In 2017, first implementations of the Kanta Personal Health Record (PHR) started, further extending My Kanta Pages to allow clients to store their own health measurement data, with a possibility to share it with the professionals.

This section examines physicians experiences of HIE in Finland using the following measures: usage of different modes of HIE (paper, RHIS, Kanta), easiness of access to key information across organisations, experienced HIE data quality, HIE speed and cross-organisational collaboration and HIS benefits in light of national surveys to physicians in 2010, 2014 and 2017. The analyses are based on the survey results in THL Data base report (2019), where working sector and year were used as grouping variables for the measures. Measures depict proportion of physicians agreeing or fully agreeing with the claims. The database uses full data from each year, whereby proportions may slightly differ compared to earlier reports (Saastamoinen et al., 2018; Hyppönen et al., 2019b) that have used different filters.

Usage of different modes of HIE

In 2017, when Kanta services had been implemented in the public sector and e-prescription had established in use in public and private sector, half of the physicians in private sector, close to 60% of physicians in public healthcare centres and close to half of the physicians in hospitals used Kanta for HIE at least weekly. Public hospitals and healthcare centres had also access to RHIS, and Kanta was used more in hospitals, but RHIS still more in healthcare centres (Figure 4.3.1).

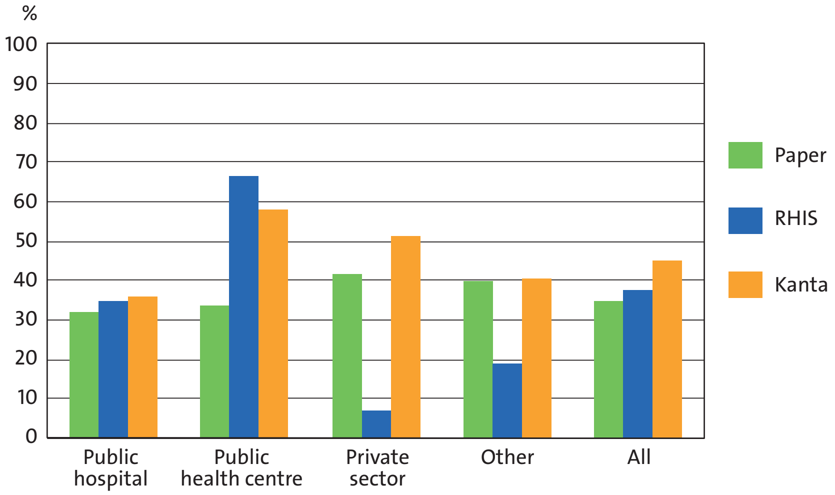


Figure 4.3.1. Proportion (%) of respondents using different modes of HIE at least weekly in 2017 (THL Data base report).

In 2017, Kanta services did not include all patient data. For example, imaging results were in 2017 available via regional registers, which became established in use long before Kanta (Reponen et al., 2015). It is therefore understandable that almost half of the private sector (48%) and public healthcare centre (46%) respondents regarded development of Kanta as one of the most urgent IT development needs.

Figure 4.3.1 shows relatively high usage of Kanta in all sectors, but usage of paper for patient information exchange was also surprisingly high still in 2017. A recent article used the 2010, 2014 and 2017 data to analyze evolution and predictors of paper use in Finland (Hyppönen et al., 2019). The results show that overall, paper use had reduced, and more so in regions using regional virtual EHR-type RHIS. The RHIS type and the EPR brand via which the RHIS was used, were the main predictors for frequent paper use. The article concluded that developing HIS usability to better meet the user needs in different contexts of use is important for improving both productivity and quality of care.

Usability and benefits of HIE were measured by the following claims in the survey, with a five point Likert scale (fully disagree to fully agree):

Easiness of access of HIE data (patient information from other organisations)

- Diagnostic imaging results are easily available on a regional level.
- Laboratory results are easily available and are logically presented on a regional level
- Information on medications ordered in other organisations is easily available
- Obtaining patient information from another organisation often takes too much time

Quality of HIE data

- Patient data (also from other organisations) are comprehensive, up-to-date and reliable

Benefits of HIS

- EHR systems support co-operation and communication between physicians working in different organisations
- Information systems help to improve quality of care
- Information systems help to ensure continuity of care
- Information systems support compliance and adherence with the treatment recommendations
- Information systems help in preventing errors and mistakes associated with medications
- Information systems help to avoid duplicate tests and examinations

Easiness of access to HIE data

Proportion of physicians agreeing with easiness of access to radiology results across organisations has remained high and increased in the public sector. Experiences of easy access to laboratory results was also high from the start, but were reduced in all sectors, most in the private sector by 2017. Experiences of easy access to information on medication prescribed in other organisations has been very poor from the start (only 5% agreeing), but has grown to 15–26% from 2010 to 2017, with the biggest increase in the private sector (Figure 4.3.2).

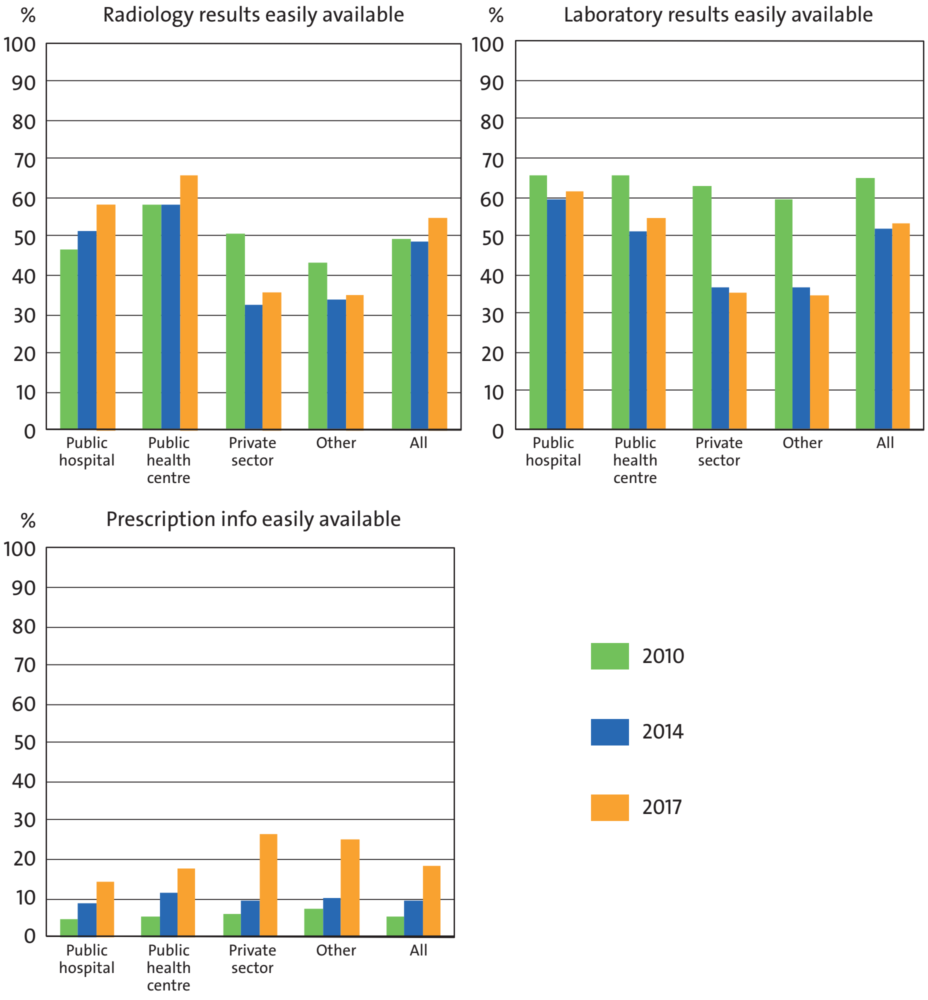


Figure 4.3.2. Proportion (%) of physicians agreeing that a) radiology results b) laboratory results, c) information on medications prescribed in other organisations are easily available (THL Data base report).

Majority of physicians (over 70%) agreed that obtaining patient data from other organisations takes too much time. Proportion of physicians agreeing has increased in all sectors from 2010 to 2017, but a slight decrease can be seen in hospitals and private sector from 2014 to 2017 (Figure 4.3.3).

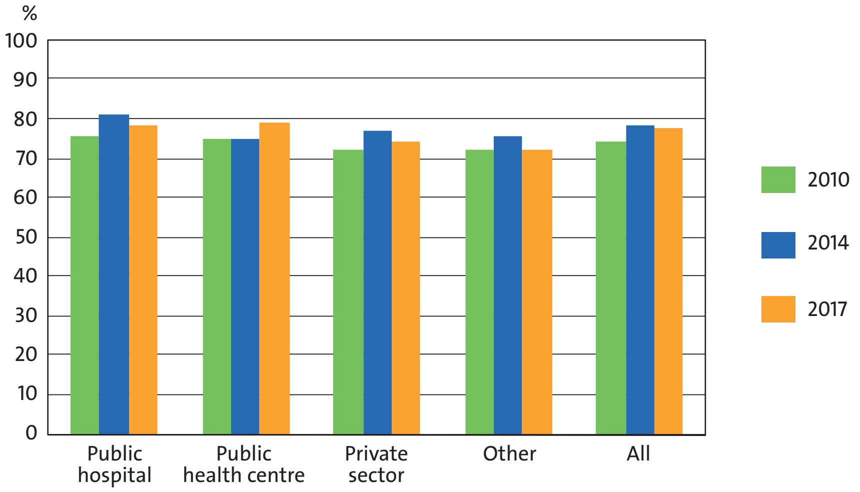


Figure 4.3.3. Proportion (%) of respondents agreeing or agreeing fully that obtaining information from other organisations takes too much time (THL Data base report).

Quality of HIE data

Physicians' experiences of data quality were estimated with claim "Patient data offered by EHR systems (also from other organisations) are comprehensive, up-to-date and reliable". Less than a third of public healthcare centre respondents, fourth of public hospital respondents and fifth of private sector respondents agreed or fully agreed with this claim, and the situation has not improved from 2010 to 2017 in any sector (Figure 4.3.4).

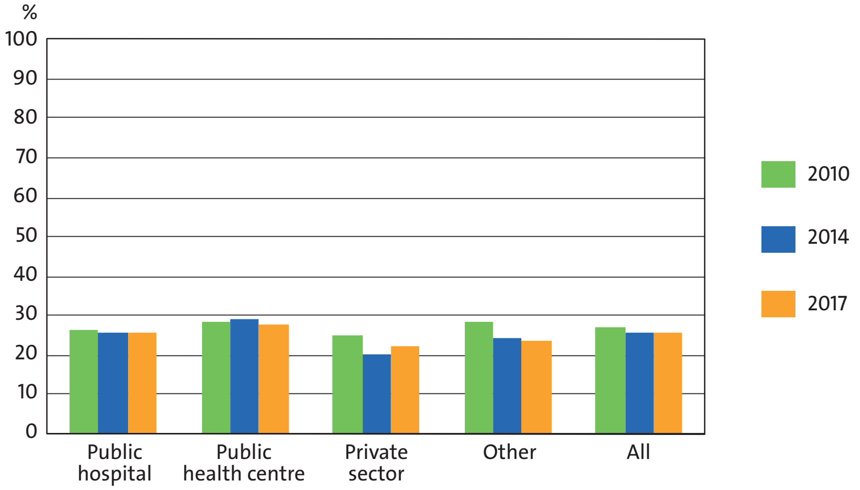


Figure 4.3.4. Proportion (%) of respondents agreeing or agreeing fully that patient data quality from other organisations is good (THL Data base report).

Benefits of health information systems

The main aim for (national) investments in health information systems is increasing the effectiveness and impact of the service system. The HIS benefits mapped in the physician survey measure impacts on cross-organisational collaboration, care continuity, quality of care, medication errors, adherence to care guidelines, and prevention of duplicate tests.

Proportion of physicians agreeing that IT supports collaboration between physicians in different organisations or physicians and patients remained very low, although slight increase can be seen especially in public healthcare centres after 2014. This is in spite of availability of patient data via RHIS and Kanta in the public sector (Figure 4.3.5). Poor private sector results are understandable because they did not have access to RHIS or Kanta in 2017.

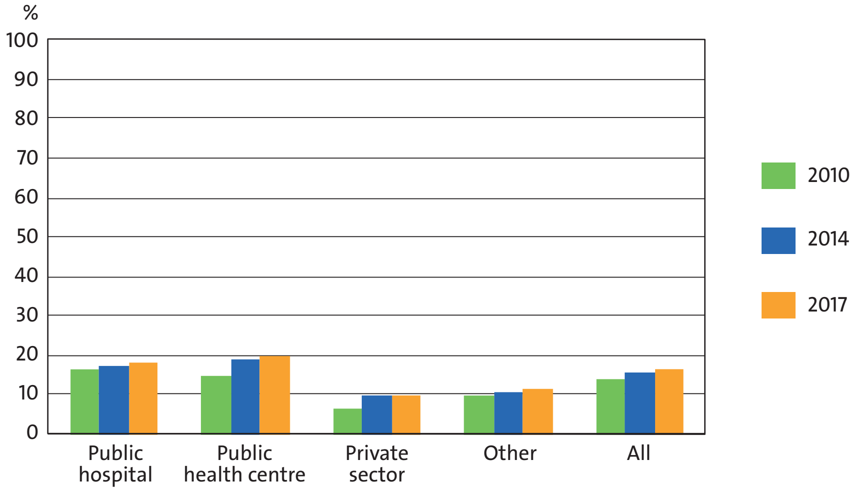
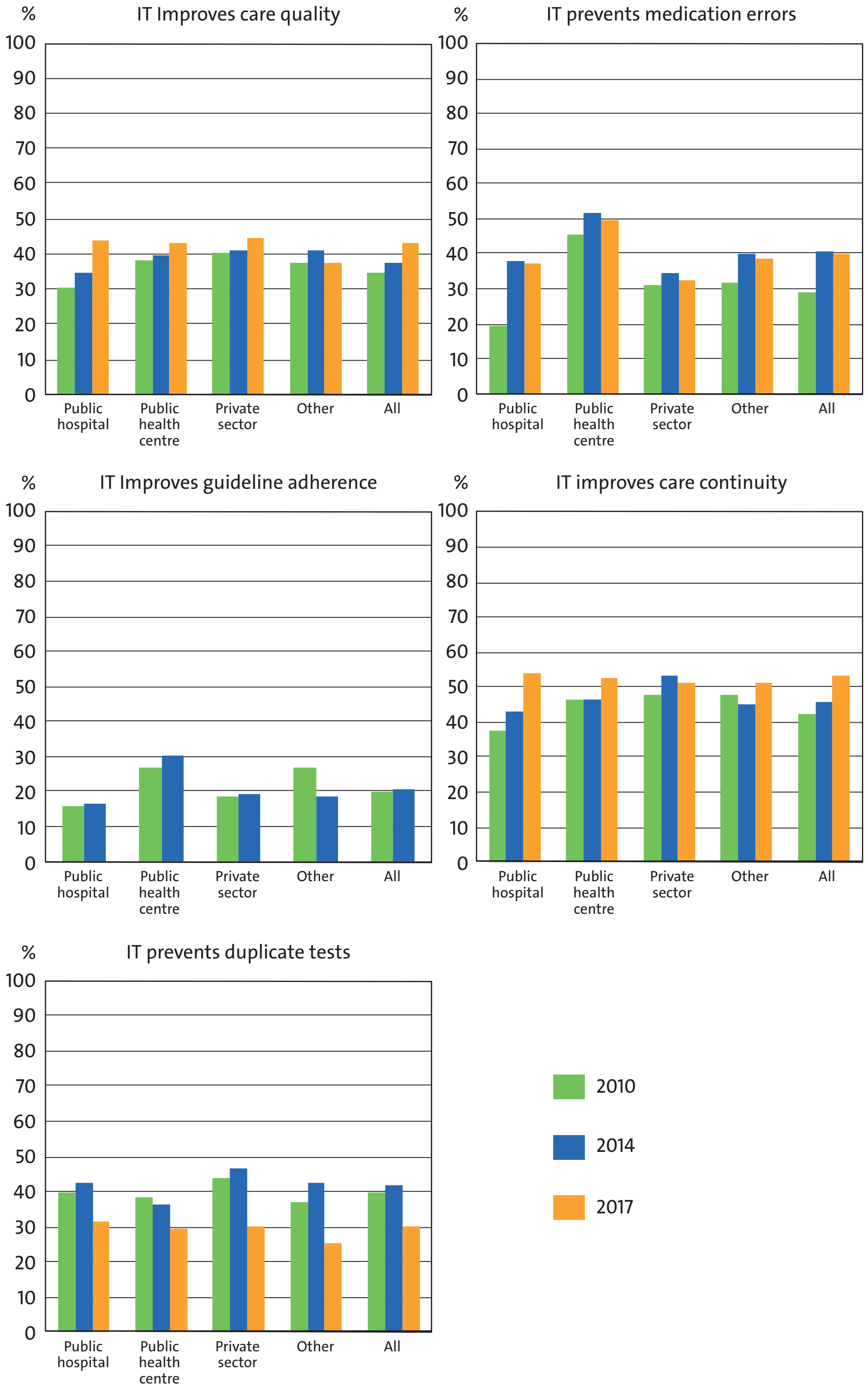


Figure 4.3.5. Proportion (%) of respondents agreeing or agreeing fully that IT supports collaboration of physicians in different organisations (THL Data base report).

Experienced support for quality of care has slowly increased steadily from 30–40% in 2010 to approximately 45% in 2017 (Figure 4.3.6). Views on IT supporting adherence to care guidelines are most positive and have improved (to 30% agreeing) in the public healthcare centres.

Views on IT supporting continuity of care have from start been more positive than views on other benefits (40–50% agreeing). Views have also become more positive in the public sector especially from 2014 to 2017, but not so much in the private sector. Especially hospital physicians have experienced also increased support for medication error prevention since 2014, although only less than 40% agreed in 2017, compared to approximately half of physicians agreeing in healthcare centres, but only approximately 30% in the private sector. Proportion of physicians agreeing that health information systems help prevent duplicate tests has diminished from approximately 40% close to 30% in all sectors from 2010 to 2017.



IT Improves care quality

IT prevents medication errors

IT Improves guideline adherence

IT improves care continuity

IT prevents duplicate tests

Figure 4.3.6. Proportion (%) of physicians agreeing or fully agreeing with five claims measuring HIS benefits.

4.4 Physician-patient collaboration

Hannele Hyppönen, Jarmo Reponen, Pia Liljamo

There were two claims in the physician survey measuring IT support for physician-patient collaboration:

- EHR systems support co-operation and communication between physicians and patients
- Patient-produced information helps improve quality of care

Overall, IT support for physician-patient collaboration has remained very low with around 10% of public sector physicians agreeing with the claim, although improvement can be seen especially in public healthcare centres from 2014 to 2017. Private sector physician experiences were better with over 20% of physicians agreeing that IT supports doctor-patient collaboration. This may be due to active role of private sector in developing e-services for their patients.(Figure 4.4.1)

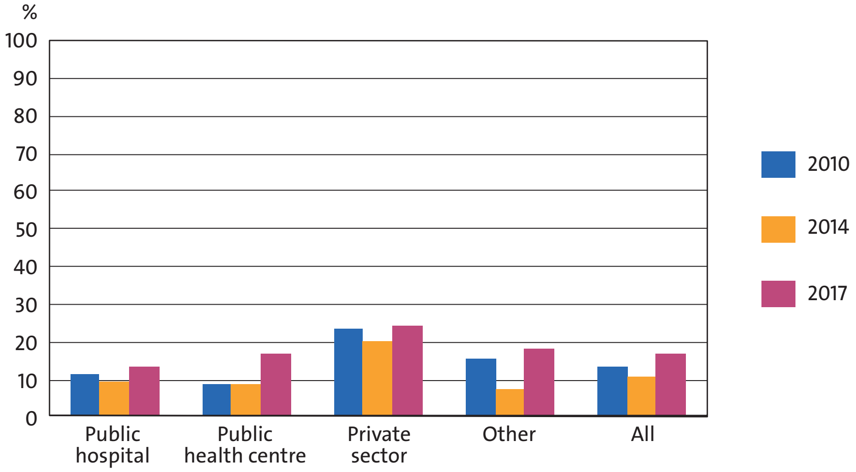


Figure 4.4.1. Proportion (%) of physicians agreeing or agreeing fully that IT supports physician – patient collaboration (THL Data base report).

Physicians' views regarding care quality improvement due to patient-produced information were also still relatively negative (overall only approximately 25% agreeing) still in 2017, but have become more positive especially in public healthcare centres (Figure 4.4.2).

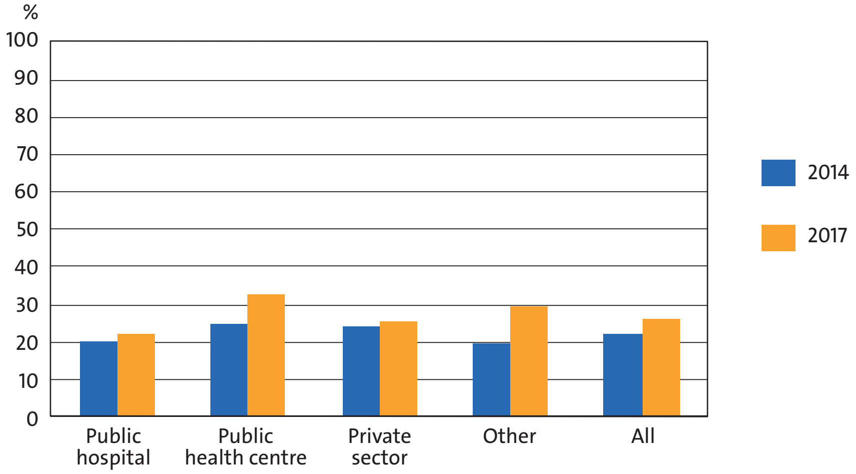


Figure 4.4.2. Proportion of physicians agreeing or agreeing fully that patient-provided information improves quality of care (THL Data base report).

Collaboration and information exchange between health professionals and patients is expected to improve by new digital health service solutions. In the Virtual Hospital 2.0 –project (during 2016–2018) financed by the national program 'Digitalizing Public Services in Finland' have been developed client-oriented digital health services to citizens, patients and professionals. These new e-health services offer for secondary care patients a multi-channel service path or a treatment programme alongside with traditional visits to clinics. E-services can also be delivered entirely online with video appointments or by the message functions. Even though most of the transferred messages are processed by nurses, physicians can answer the questions directly and view the patient-produced information, too. There are over 90 digital treatment paths for many different patient groups, like diabetes, rheumatic and coronary artery disease (Arvonen & Lehto-Trapnowski, 2019.). In the primary healthcare, parallel e-services financed by the national program are developed in the ODA project among the major cities in Finland. One of the results in ODA is a smart symptoms assessment, called OMAOLO. It enables the citizen to evaluate the symptoms before contacting a healthcare professional. The citizen will be able to send the evaluation results to healthcare providers or store them to the national repository, if needed (City of Helsinki 2016).

Many healthcare service providers have since 2016 started direct chat services between physicians and patients. Their full potential is not yet fully reflected in our study results. These services are integrated to electronic patient record systems and offer mobile physician consultations directly to patients in selected disease cases. Chat doctor services are mainly available in occupational care and some private service providers offer now a 24/7 service for acute health problems (Kouri et al 2018).

4.5 Experiences on EPR learnability, technical support and proficiency of use

Jarmo Reponen

In parallel with the organisation survey mapping availability and use of human and material resources (Chapter 2.5), the physician survey enquired about physicians' experiences of EPR learnability, technical support and proficiency of use. The results are reported below. Also, a short reference about EPR education is given.

EPR learnability

Experiences of EPR learnability assessed with a statement: 'Learning to use the EPR system does not require a lot of training'. The overall satisfaction with learnability had decreased from 43% in 2010 to 37% in 2014 and to 36% in 2017. Compared to 2014 by sectors, satisfaction had decreased in public specialised care, increased in public primary healthcare and stayed the same in the private sector.

Technical support

Availability of technical support was enquired with a statement: 'If I have problems with the system I can easily get help'. Satisfaction was highest (54% of respondents agreed) in private sector, but had decreased from previous years (60% in 2014 and 61% in 2010), whereas in public primary healthcare, satisfaction had started to improve again (46% in 2017, 45% in 2014 and 52% in 2010). In public hospitals, there was also no change from the 45% agreeing with the statement.

Proficiency of use

Proficiency of EPR use was studied with two questions: 1) How long have you used the system and 2) How experienced do you regard yourself to be as a user of EPR systems (scale 1=novice to 5=proficient). In 2017, 77% of respondents had used the EPR system for over 3 years, while the proportion was 75% in 2014 and 65% in 2010. Over 70% of respondents rated their own proficiency in EPR use at level 4–5 (good-very good) as was the case already in 2014.

In Finland, the education for EPR system use is the responsibility of employers. In medical schools, the students receive only basic EPR training so that they can manage with their tasks during the studies. However, a current project financed by the Finnish Ministry of Culture and Education contains a section of e-health education with a more comprehensive teaching about EPR systems. In addition, specialized physicians and dentists have been able since 2012 to acquire a special competence in healthcare information technology.

4.6 Physicians' participation in the IT system development

Susanna Martikainen, Johanna Kaipio

The respondents were asked about their experiences on participating in to development of IT systems and providing feedback about their EPR systems. For this subchapter, participants were selected if they worked in public sector (in public hospitals or healthcare centres).

The questionnaire included the following four statements: A) I know to whom and how I can send feedback about the system if I wish to do so; B) The system vendor is interested in feedback about the system provided by end-users; C) The system vendor implements corrections and change requests according to the suggestions of end-users; and D) Corrections and change requests are implemented within a reasonable time frame. The response options were: 'Fully agree', 'Somewhat agree', 'Neither agree nor disagree', 'Somewhat disagree' and 'Fully disagree'. When analysing the results, 'Fully agree' and 'Somewhat agree' were combined to form the category 'Agree' as well as 'Fully disagree' and 'Somewhat disagree' to form the category 'Disagree'.

As compared with earlier surveys, fewer physicians seemed not to know whom to send feedback of the IT systems in 2017. In figure 4.6.1 a slightly descending trend can be seen in the 'agree' responses (statement A) from 2010 (41%), 2014 (40%) to 2017 (37%). The level of agreement to the statement about vendor's interest towards feedback from the end-users (statement B) was higher in 2014 (16%) compared to 2010 and 2017 but the disagreement rate has steadily increased over the years. The results of all three surveys show that only less than 10% of the respondents agree that corrections and change requests are implemented as users proposed (statement C). The lowest level of the agreement was in 2010, highest in 2014. Similar trend can be seen in the responses of the statement D, where only few respondents agreed that time frame of implementing corrections and change requests was reasonable (in 2010 4%, in 2014 6% and in 2017 6%).

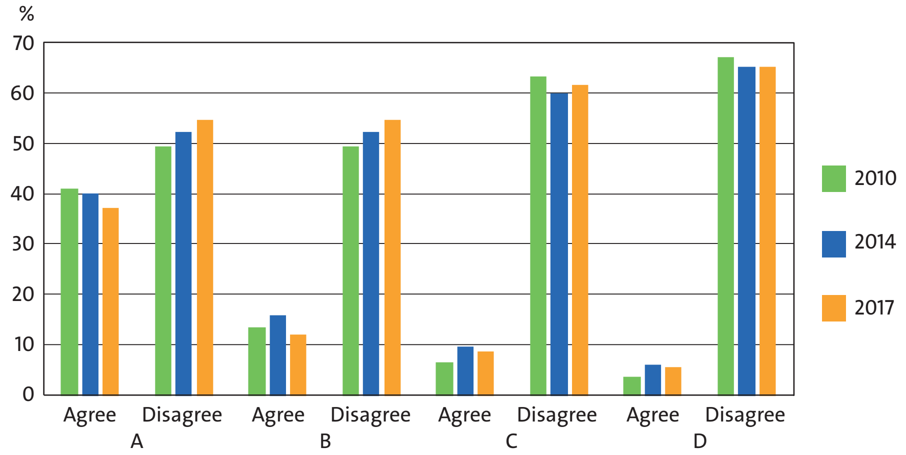


Figure 4.6.1. Frequencies of responses to the four statements measuring user participation.

4.7 Health Information system support for management

Tinja Lääveri

In the usability survey of 2017 for physicians, there was a separate section concerning HIS support for management. If the respondent had replied working in a managerial position (n=987), she/he was directed to this section. A total of 727 (74%) of them responded to at least one of the statements.

The usability and utility of health information management systems was assessed by ten statements: (1) I am obliged to put together the information needed in management from various information systems. (2) By means of the information systems, I can steer daily operations. (3) Information systems facilitate measurement and monitoring of quality of operations. (4) Available data support research, innovation and business activities. (5) The information systems help me to monitor the implementation of the goals set by my unit (e.g. total numbers of patients, treatment times, and types of measures). (6) The monitoring information produced by the systems is reliable and error-free. (7) The information systems have helped improve the effectiveness of my unit during the past few years. (8) I can monitor the use of personnel-, equipment- or room-related resources from the information systems. (9) I use systems that enable the monitoring of operations daily. (10) It is easy to do the searches one wishes to do with the systems that monitor operations.

The results for the year 2017 are reported below by the physician's working sector (University Hospital, central hospital/other hospital, healthcare centre, private sector).

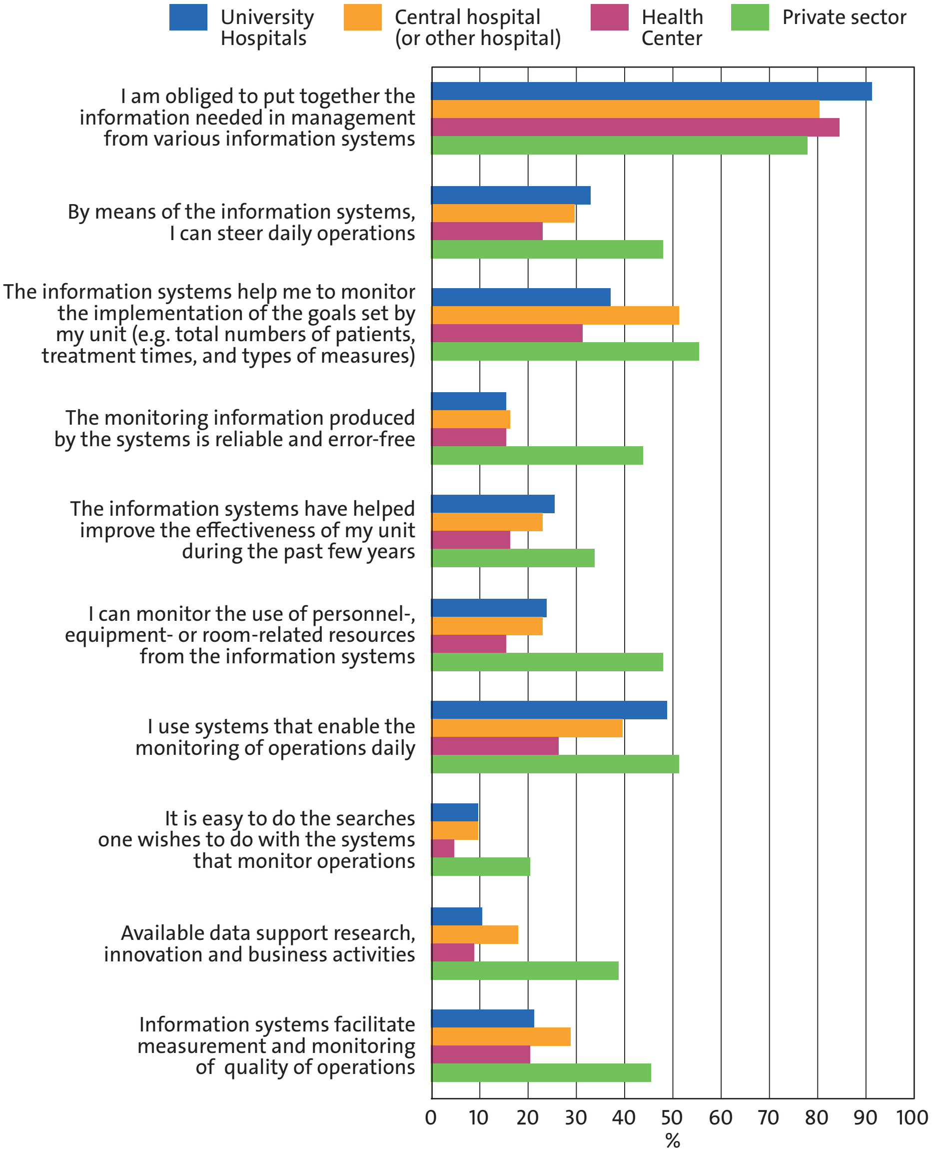


Figure 4.7.1. Proportion of physician leaders agreeing with statements concerning HIS support for leadership and management. The responses are reported by working sector (University Hospital, central hospital/other hospital, healthcare centre, private sector).

Most of the respondents (84%) replied that they had to put together the information needed for management purposes from several information systems. This seems to contradict the findings from the organisation survey where especially specialty care organisations reported having integrated IT systems for management (see chapter 2.4 in this report). The explanation for this discrepancy may be that the systems are technically integrated but searches are performed in a separate system instead of the EHR system itself. Possibly related to this, carrying out searches was not considered easy. Despite this, 40% of respondents used management information systems daily. Physicians working in healthcare centres reported less use (21%) than those working in hospitals (39–48%) or private sector (51%). This is readily explained by the lower availability of management information system tools in primary healthcare (see chapter 2.4 in this report). Data quality provided by the management systems was generally considered poor: 15–16% of the respondents working in public sector hospitals or healthcare centres considered the monitoring information produced by the systems to be reliable and error-free, however, 44% of those working in private sector agreed with the statement. Support for daily management was also considered inadequate: Of the respondents, 23–48% considered that information systems enable steering daily operations, 31–55% replied that information systems assist in monitoring implementation of goals and 15–48% regarded that systems enable monitoring of resources. Further, 16% in healthcare centres, 24% in hospitals and 34% in the public sector considered that information systems have improved effectiveness over the past few years.

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5 Nurses' experiences of health and social care information systems

Ulla-Mari Kinnunen, Hannele Hyppönen,
Pia Liljamo, Kaija Saranto

5.1 Introduction

In this chapter, the results of a national survey of nurses' experiences of health and social care information systems are presented. The results are related to the nurses' overall satisfaction with their health information systems (HIS) and their experiences on use, utility, and usability of the systems as well as digital collaboration with patients, proficiency of use, and technical support and participation in development work. This is the first time in Finland the national survey was extended to nurses. In this chapter, the concept health information system (HIS) is used to comprise electronic record system for nurses both in health and social care.

Each nurse practicing in health and social sector in Finland, whether public or private, should have the right to practice as a licensed or authorized professional and authorizes the use of the occupational title of healthcare professional granted by the National Supervisory Authority for Welfare and Health (Valvira) (Valvira, 2015). Valvira also registers all persons granted professional practice rights in the Terhikki register and maintains information on all registered nurses. This procedure has proved to strengthen not only the quality and safety of services but also mobility of professionals in the country. In addition, all medical or healthcare professionals working in Finland must be able to speak well enough either Finnish or Swedish.

In Finland, nurses have used health information systems since 1970's, when computers were first introduced in healthcare. The first systems in primary healthcare were mainly used by nurses, and they were also often responsible for scheduling and rostering systems, which were the first applications in healthcare. In hospital settings along with advances in health information system development nurses were introduced to a variety of systems used in specialized healthcare for monitoring patients in intensive care unit or operating rooms. In Finland, many regions have joint health and social care services, and this has effects on information systems. Thus, nurses have also expertise in social care information systems. Overall, the user experience level of own information system has been rated as very advanced and the number of information systems used daily is high (Kinnunen et al. 2019).

In Finland, nurse education follows the European standards comprising of 210 ECTS (1 ects = 27 hours work) usually in a seven terms bachelor program. In terms of specialization in health information technology (HIT) use in practice, a master's degree (90 ECTS) is also available in several universities of applied sciences (e.g. Savonia). The Finnish Nurses Association (FNA) has established a special certification program in Nursing Informatics (Liljamo et al. 2017) for nurses working in HIT field. With this recognition, nurses can make visible their competencies in practice. FNA has also published an eHealth Strategy for Nurses to guide the implementation of digital services, education, management, and research in healthcare (Ahonen et al. 2015). Approximately 40% of registered nurses belong to FNA assigned to advance and support professional and career development. Some 60% belong to the Union of Health and Social Care Professionals in Finland (Tehy), which has assigned to monitor interests and rights in nursing practice. Both these promotion of interest communities organize seminars and workshops to support nurses' daily practice.

In terms of further education in health informatics at the University of Eastern Finland (UEF), a master's degree program (120 ECTS) in health and human services informatics has been available since 2000. This program accredited by the International Medical Informatics Association (IMIA) has increased nurses' possibilities to focus on managerial, development and research in their career. Most of the applicants have health, social, or computer science or business studies bachelor's degree when entering the master program. Thus, the interdisciplinary group of students has an excellent opportunity to practice teamwork and argumentation together (Saranto et al. 2017; Kinnunen & Saranto 2018).

According to the Official Statistics of Finland and National Institute for Health and Welfare (THL) there were 80 622 nurses (including nurses, community health nurses, midwives) employed in healthcare and social services in 2014 (THL 2018). The ratio of the number of physicians to nurses working in healthcare settings for 1000 inhabitants in 2015 was 3.2 physicians and 14.5 nurses (OECD 2017). Beside those having a nursing degree there are community health nurses and midwives especially working in primary healthcare. All these professionals have used electronic information systems in their daily practice since 1980's. However, the most active period of implementing new systems was late 2000 when the regulation for electronic documentation came into effect. For many nurses their responsibilities have widen remarkably as new duties such as care coordination, e-prescribing and data analytics have been assigned to them. In reality, the number of nurses with this kind of job description is growing (OECD 2017). In Finland, approximately 440 nurses have been authorized to prescribe medication according to their education regulated by the Ministry of Social Affairs and Health. At present, the transition from face to face encounters to digital services is active both in public hospital and primary healthcare. Patient portals (interactive and authorized) are used widely to support wellbeing but also to monitor patient suffering from various diseases, such as diabetes, cardiovascular or neurological diseases (Saranto et al. 2018).

In both hospital and primary healthcare, a variety of development projects have been carried out specially to implement structured documentation during the last 20 years. Along with the implementation of HISs, nurses have adopted the use of nursing process model to plan care and to structure documentation. Since late 1990' the implementation of nursing terminologies to describe nursing diagnoses, interventions and outcomes (Finnish Care Classification, FinCC) (Kinnunen et al. 2014) and intensity of care (RAFAELA© patient classification system) (Liljamo et al. 2018) have been a major challenge but also a success. According to international studies, the use of structured nursing documentation facilitates patient safety and quality of care (Saranto et al. 2014; Törnvall & Jansson 2017) as well as facilitates data re-use for administrative and economic purposes (Meystre et al. 2017; Liljamo et al. 2018). Finnish nurses have been very active internationally to advance digitalization in health and social care and networked with a variety of groups e.g. IMIA, European Federation Medical Informatics (EFMI), Association of Common European Nursing Diagnosis, Interventions and Outcomes (ACENDIO) and International Society of Telemedicine and eHealth (ISfTeH) as well as followed the work of ISO and HL7. In social care, the implementation of structured documentation has started in 2016 and a special project to advance knowledge and skills in documentation has been set up. In terms of documenting and coordinating care and services, the public joint service system for health and social care has been challenging from information systems point of view as interoperability has been in its infancy due to legislation, but also to work cultural issues especially in homecare (Kuusisto-Niemi et al. 2014).

5.2 Data collection

The study focused on working-age nurses, community nurses and midwives (under 65 years of age) whose educational levels are identical. The research questions for the nurses were as follows:

1. What is the level of HIS usability for nurses?
2. What is the level of HIS usability for patient information exchange and work processes?
3. What is the level of HIS usability for digital collaboration with the patients?
4. What is the level of nurses' proficiency of HIS use?
5. What is the level of technical support and possibilities of HIS development for nurses?

The survey was conducted through THL online questionnaire service and administered by FNA and Tehy in February-April 2017. The questionnaire had been drawn up using the EHR questionnaire for physicians (Viitanen et al. 2011a; Viitanen et al. 2011b; Kaipio 2011; Martikainen et al. 2012; Hyppönen et al. 2014). Representatives of THL's Expert Subgroup of Nursing, Laurea University of Applied Sciences, Department of Health and Social Management from UEF, FNA and Tehy participated in the formulation of questions, taking into account the content and comprehensiveness of the questions from a nurse's point of view. In the development of the questionnaire, the content of FNA's eHealth Strategy (Ahonen et al. 2015) was also considered. New questions were created for the informatics competency section of the survey, utilizing international and national expertise research (Staggers et al. 2002;

Rajalahti 2014; Hübner et al. 2016). Most of the questions were statements that the respondents rated on a five-step Likert scale where 1 = fully disagree, 2= disagree somewhat, 3 = neither disagree nor agree, 4 = agree somewhat, 5 = fully agree. The topics in this nurses' module are:

1. Usability of HIS (14 statements, 5-step Likert scale) including also HIS school grade
2. Usability of patient information exchange and utility of systems (8 statements, 5-step Likert scale
3. Usability of digital collaboration with patients (1 statement, 5-step Likert scale and 1 important development area)
4. Proficiency of use (16 statements, 5-step Likert scale, response options varied from 'poorly' to 'very well', 1–5)
5. Technical support and participation
   - 4 statements under the question: What kind of experiences have you had about giving feedback on the EHR systems you use and about development?
   - 1 question: Have you participated in the development of EHR? (plenty, little, not at all)

The ethical approval was obtained from the ethical committee of THL 24.10.2016. The FNA and Tehy sent a link to an electronic form for all those members of the membership register (excluding retired, students and entrepreneurial members) who had provided up-to-date contact information (including an email address). The form was sent to 29,283 nurses and reminders were sent two times. In the first round, the email link was opened by 10 006 nurses, and the number increased only a fraction after two reminder emails. A total of 3,607 replies were received by the deadline. This represents 5% of the theoretical target population, 12% of the sample, and 35% of those that opened the mail. Replies were received from all hospital districts. Compared with the employment statistics of the nurses, midwives or community nurses (THL 2018), the respondents represented well nurses employed in public hospitals, in healthcare centres, in the private sector and social care (Table 5.1). The average age of respondents was 46.3 years (range 22–66 years). The user experience level of own clinical information system was rated as very advanced by 27.9% (n = 1,006) of the respondents. Less than one percent of the respondents assessed themselves as a beginner in the use of HIS.

Table 5.1. Respondents by sectors and sub sectors.

Sector	Sub sector	n	%
Public hospital	University hospital	825	24
	Central hospital	604	17
	Other public hospital (disctrict hospital, city hospital)	432	12
Healthcare centre	healthcare centre/ well-being centre	824	24
Private sector	Private clinic, health-care centre, or -hospital	104	3
	Foundation, association or non-governmental organization	96	3
Social care	Social welfare (social care; institutional care, service housing with 24-hour care, social services; non institutional	489	14
Other	State office, department or hospital	26	1
	Other	63	2
Missing data		144	4
All		3607	100

5.3 Usability of health information systems (HIS)

In previous studies focusing on nursing informatics, various types of usability problems have been seen as a major factor for unsuccessful use of health information systems (HIS); Hasty implementations with poor education and guidance have lead sometimes to slow acceptance of health information technology (HIT). However, nurses have seen HIT adoption to support nurse-patient relationship effectively (Koivunen & Saranto 2017).

Nurses also highlight the importance of coordination, leadership and collegial support in HIS implementation. In many studies, the impact of structured nursing documentation has been of interest. According to results although being forced to use systems with almost no-interoperability nurses have seen benefits to structure their notes and use nursing terminologies to describe nursing diagnoses, interventions and outcomes (Saranto et al. 2014). Nevertheless, it seems that nurses are frustrated, as the information flow does not follow the workflow in nursing care (Törnqvist et al. 2016).

The secure data availability and system's function as expected support best the aims of the Finnish eHealth and eSocial Strategy 2020 (Ministry of Social Affairs and Health 2015) in all sectors. The best functionalities of the HIS for nurses of all sectors were patient data availability regardless the nurse's location, e-prescription, and the usability of standardized nursing documentation. Concerning standardized nursing documentation, this result is congruent with the earlier studies (Kinnunen et al. 2014). The most urgent development areas were multi-documentation, system failures and slowness, compiling of nursing summary, and improvements of medication list.

The nurses were asked to assess their principal HIS system with a school grade in a scale from 4 to 10 (4 = fail, 5–6 = poor, 7–8 = fair, 9–10 = good). Figure 5.1 illustrates the percentage of grades by sectors, which clearly mainly sets between 6 and 8.

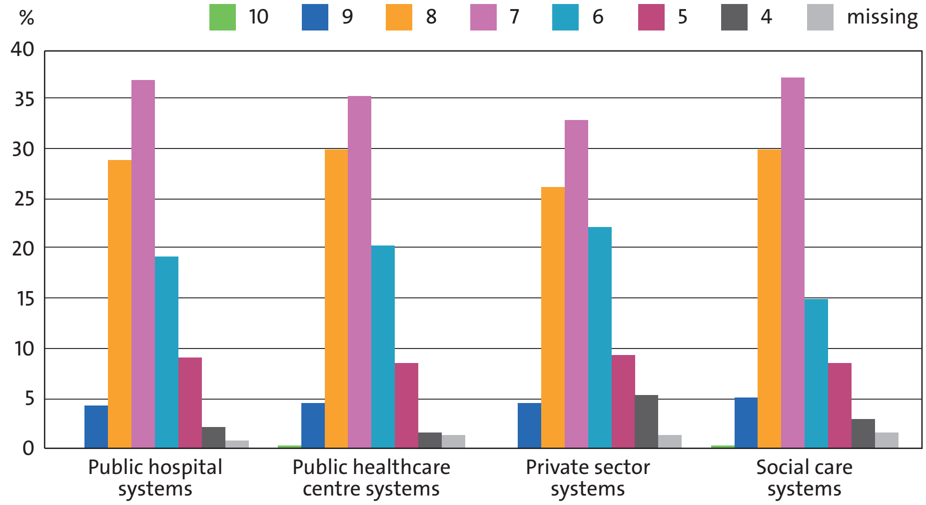

Figure 5.1. HIS school grade given by nurses from different sectors.

The public hospitals' and healthcare centres' HIS systems were scored higher compared to HISs used in private sectors. Social sector's HIS scored the best compared to public hospitals', public healthcare centres' and private sectors' HIS. Based on the results the overall satisfaction of nurses on public hospitals was 6.93 (mean, SD 1.094), public healthcare centres 6.98 (mean, SD 1.091), private sector 6.79 (mean, SD 1.228), and social sector 7.00 (mean, SD 1.130).

In terms of usability, it seems that nurses working in social care had more positive experiences compared to nurses working in other facilities (Figure 5.2). For the analysis, the five-step Likert scale -answer 'Fully agree' and 'Somewhat agree' were combined to form the category 'Agree'. Overall, the level of agreement among the statements of usability reached 55% agreement the highest. The respondents agreed that nursing data is easily available and logically presented in nursing records (range from 45 to 55%). Further, they felt that terminology on the screen is clear and understandable (for example titles and labels) (range 48–53%). The respondents agreed that it is easy to obtain necessary patient information using the HIS (range 46–48%). Faulty system function was not seen harmful among respondents (range 11– 25%). However, nurses working in public hospitals (25%) assessed faulty system function as a risk. The respondents disagreed almost equally (20%) that information entered or documented occasionally disappears from the information system. They also disagreed (range 17–23%) that the information system frequently behaves in an unexpected or strange manner.

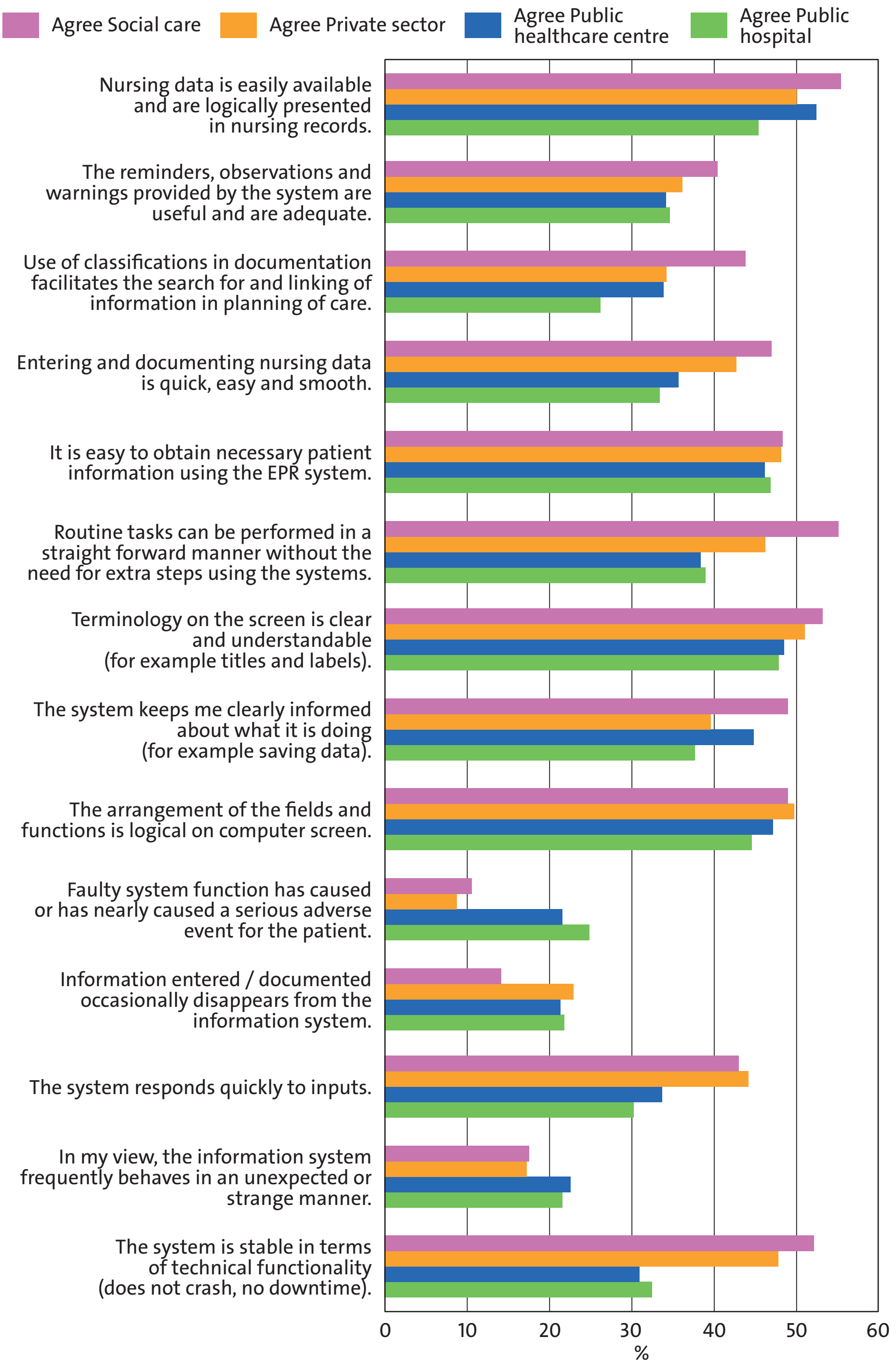

Figure 5.2. Usability of health information systems (HIS).

The technical functionality of the system was assed more positive in social care (52%) and private sector (49%) than in public sector healthcare centre (32%) and hospital (32%).

Nurses were asked to choose from a list the best features and functionalities implemented in HIS. For nurses of all sectors they were patient data availability regardless the nurse's location (29% of the respondents), e-prescription (29%), and the usability of standardized nursing documentation (24%) which facilitates getting the general view of the patient. The main development areas which mostly hamper daily nursing practise were also asked to choose from a list, and they were documenting the same patient data in several times and places (41%), system failures and slowness (33%), not automated nursing summary (32%), and deficiencies in medication list (31%).

Overall, there seemed to be mixed feelings in terms of usability issues among the respondents. The highest trust of the statements was received in their use of systems as they were confident that information will not be lost after documentation. This result is contradictory with an earlier study (Viitanen et al. 2011) where nurses disclosed problems of finding earlier documented patient information, and procedures not supporting the professional needs. It is also noteworthy that nurses working in social services had more positive experiences than nurses working in other facilities did. Bearing in mind the short timeframe in implementations of information systems in social services this is a good sign for the future. Nurses working in private sector were most confident about the secure use of information systems.

In each sector, the respondents agreed that the clear and understandable terminology on the screen and the easiness to obtain patient information from the system supported usability of the systems. Respondents from social sector also agreed that routine task can be performed in a straight forward manner which was not the result from respondents working in public hospitals. In international studies, nurses have also been dissatisfied with the systems' ability to support daily workflow and information needs (Saranto et al. 2014, Törnqvist et al. 2016; Törnvall & Jansson 2017).

5.4 Usability of patient information exchange and utility of systems

This chapter depicts results related to the nurses' experiences on usability of patient information exchange and utility of HIS. In previous studies where nurses' experiences to use electronic discharge summaries were of interest, surprisingly, although the summaries exchange relevant information between hospitals and healthcare centres, it was not used as often as possible. Further, nurses felt that the quality of information was not always up-to-date and that was regarded a risk for patient safety (e.g. Kuusisto et al. 2014). In other studies, effects of electronic information exchange on costs and resources have been of interest. Mäenpää and her associates (2011) found out that a regional health information exchange system was not used on demand and additional laboratory tests were made in vain. In recent studies the development of digital health services in the means of patient portals have shown to provide timely data for care teams as shared databases are accessible for members of the team (Saranto et al. 2018).

According to the results, half or slightly more of nurses (range 49–59%) felt that information systems improve the quality of care (Figure 5.3). The respondents in all different sectors agreed that HIS help to ensure continuity of care (agreement range 61–70%); the best experience of this was in social care.

The respondents were equally dissatisfied with their experiences about HIS capability to prevent errors and omissions associated with medications (agreement range 34–40%).

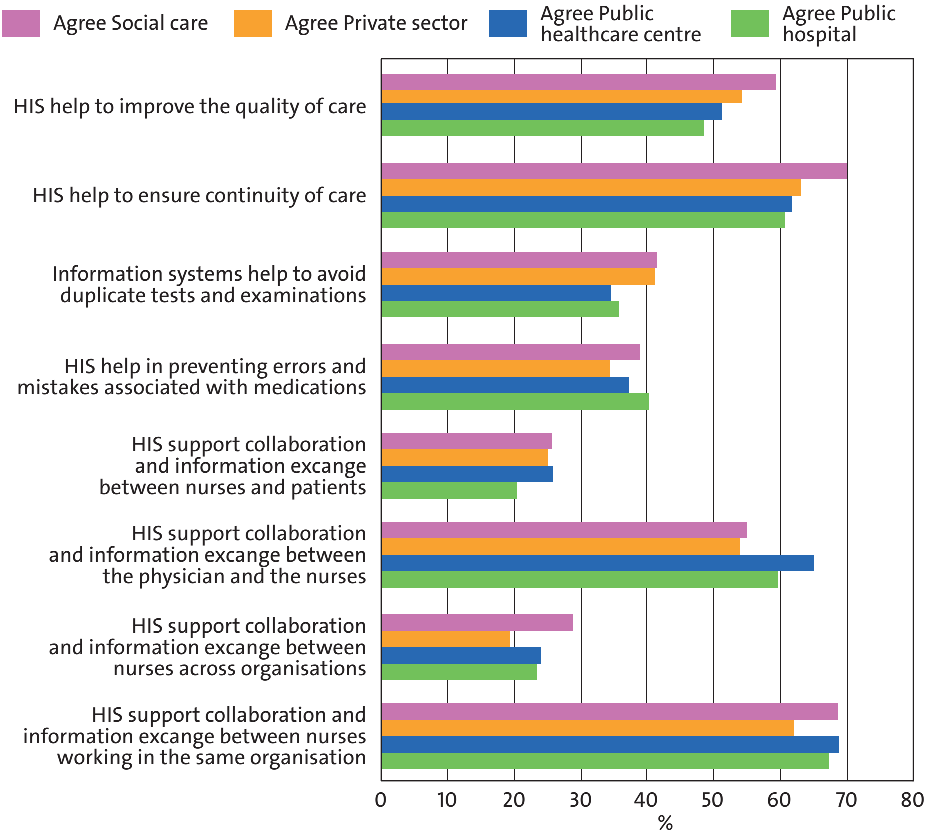

Figure 5.3. Usability of patient information exchange and utility of HIS.

Nurses were asked how HIS support collaboration and information exchange between different professionals and between nurses and patients. The respondents disagreed almost equally (75–80%) that this support works the worst between nurses and patients. The agreement results (19–29%) were not flattering with collaboration between nurses across different organisations. The results were reversed when asked collaboration between nurses in same organisation, almost 70% of respondents were satisfied with that. Just over half of the respondents agreed that HIS supports collaboration and information exchanged between nurses and physicians.

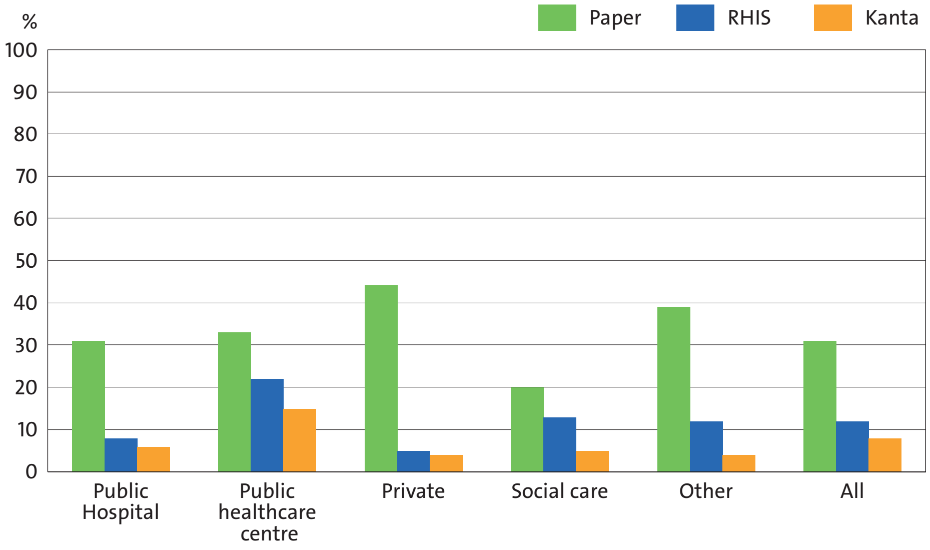

Figure 5.4. Proportion (%) of respondents using different modes of HIE at least weekly.

The use of regional health information systems was the highest in public healthcare centres were information exchange occurred 22% at least weekly. Further, the use of Kanta services was most active in public healthcare centres were the number of users were 15% of the respondents in the sector. The number of non-users was 30% of all respondents the highest proportion in private sector (57%). In addition, daily nursing documentation and medication administration data are not yet stored in Kanta, but are available via RHIS. Nursing summary was the first nursing document, which according to national Act (1257/2015) needs to be saved into the national Kanta services for every ending care period.

In earlier studies (Mäenpää et al. 2012, Kuusisto et al. 2014) nurses had also unsatisfactory experiences of the health information exchange and it seems that the results of this survey support earlier studies. Further, nurses were unsatisfied in information systems' capabilities to support aggregation of nursing summaries especially in hospital and primary healthcare. However, this was one of the top five development actions needed in each sector. Respondents also expressed the need to improve slow system functions and risk of downtime as well as replication of data on various screens, which all have been seen risks of patient safety in previous studies (Palojoki et al. 2016).

Each sector was critical towards systems' support to information exchange between sectors. This is crucial as timely, accurate and overall, high quality data is the key component of safe care. Further, this has effects also on nurses' workload and waste of time (Koivunen & Saranto 2017). In this survey less than half of the respondents felt that it is possible avoid duplicate tests and examinations by using HIS. This result is in line with a previous study, where nurses believe that one of the most important problems to be corrected in HIS was to record the same data in several different places and to copy and transfer information to different information systems and applications (Törnqvist et al. 2016).

Surprisingly use of paper at least on weekly basis was frequent in each sector being highest in private sector where some 44% of information exchange was used with paper. Comparing the situation to the results of physicians´ survey, usage of paper was also common but not as pronounced. This result is alarming as two parallel systems are always regarded as a risk for patient safety (Palojoki et al. 2016). The use of Kanta services was most active in public healthcare centres were the number of at least weekly users were 15% of the respondents in the sector. By 2017 Kanta was fully implemented in the public health sector, social and private sector implementations were on the way (Hyppönen et al. 2018). This can also be seen clearly in the results.

5.5 Usability of digital collaboration with patients

In previous studies, the role of patients, patient-nurse relationship, and interactive communication have been highlighted as an important factor concerning the use of HIS in nursing (Koivunen & Saranto 2017). One of the aims of Finnish eHealth and eSocial Strategy 2020 (Ministry of Social Affairs and Health 2015) is that citizens use online services and produce data for their own use and for professionals. Also, the aim is that reliable information on well-being and services supporting its utilization are available and assist citizens in life management and in promoting their own well-being or that of their family and friends. Online self-management services and information management associated with them may support the prevention of health problems, self-assessment of the need for services and independent coping.

Nurses were asked to evaluate the pros and cons of HIS use concerning the usability of digital collaboration with patients with the statement 'The use of HIS takes the observation away from the patient very often'. A very big portion, in public hospitals (73%) and in public healthcare centres (68%), of nurses agreed with this statement. Responses from other sectors show no better results. Also, one of the problems of HIS, which hampers nurse's daily work, was that 'Electronic communication with the patient is missing or is very difficult'. The results show that particularly in the public sector (52%) the digital communication with the patient is poor (Figure 5.5).

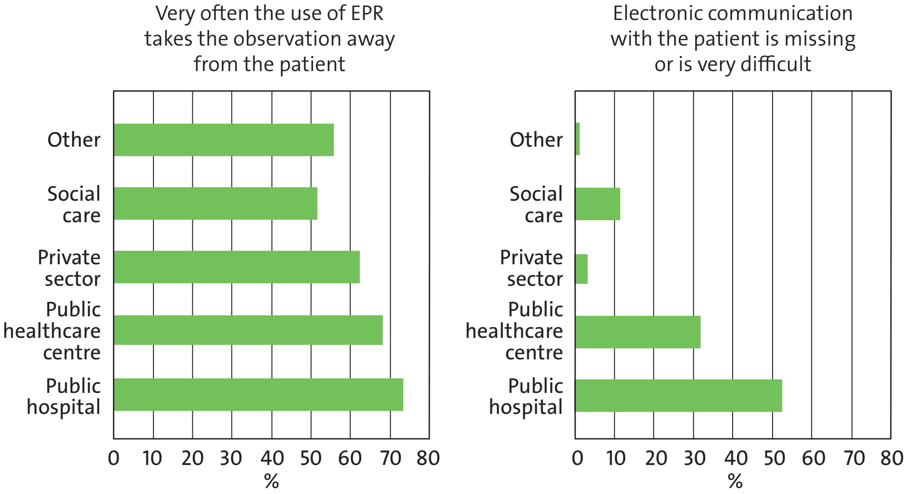

Figure 5.5. Proportion of nurses agreeing about the use of HIS taking the observation away from the patient and electronic communication with the patient.

It is alarming that only a minority of respondents felt that information systems are supporting nurse–patient relationship. In international studies, telehealth has been a facilitator to use HIT (Koivunen & Saranto 2017). The difference may be due to mixed background of respondents representing various sectors and facilities, and timing. Between 2016 and 2018, two pilots to enhance virtual care in forms of interactive and secured patient portals have been carried out and the effects will be seen the following years (Saranto et al. 2018). Thus, in the future collaboration and information exchange between nurses and patients is expected to improve by new digital health service solutions. In the Virtual Hospital 2.0 -project financed by the government as a part of the national program 'Digitalizing Public Services in Finland' have been developed client-oriented digital health services to citizens, patients and professionals. By new digital services, it is possible to offer for patients a multi-channel service path or a treatment program alongside with traditional visits to clinics, examinations and procedures. Digital services can also be delivered entirely online with video appointment or communication between the patient and the nurse by the message functions. There are over 90 digital treatment paths for many different patient groups such as diabetes, rheumatic and coronary artery disease (Arvonen & Lehto-Trapnowski 2019).

5.6 Proficiency of use

Structured nursing documentation and the national nursing documentation model have been developed in Finland in several projects since the beginning of 2000. The development of the model is organized by the University of Eastern Finland (UEF) and the Finnish Care Classification (FinCC) expert group, which works closely with the THL. The model includes in curriculums of nursing schools in all Universities of Applied Sciences. However, in order to get nationally unified nursing records the model needs to be implemented broadly. The joint understanding of the effects of structured nursing data will lead to several possibilities of data re-use in nursing. In addition, the acceptance and support of nurse managers is of high importance to implement the model in practice (Saranto et al. 2014; Liljamo et al. 2018; Kinnunen et al. 2019).

Informatics competencies for nurses have been a research interest since the beginning of 21st century. In a very recent research, a six domains framework consisting of 24 core competency areas in health informatics and five major roles of nurses have been defined. The domains include: Data, information and knowledge, Information exchange and information sharing, Ethics and legal issues, Systems life cycle management, Management in informatics, and Biostatistics and medical technology (Hübner et al. 2018). The wide evolution of health information technology (HIT) has raised also the question of the amount and quality of proper education and training of new systems in social and health care. Globally exemplary programs or minor educational unities have been developed to respond to this challenge (HIMSS 2019).

This section presents results related to the nurses' informatics competencies. Totally 16 statements measured competency skills. The sum variables depicting four domains of nurses' informatics competencies were generated: 1) Terminology-based FinCC) documentation, 2) Patient-related digital work, 3) General IT competency, and 4) Electronic documentation according to structured national headings (Kinnunen et al. 2019) (Table 5.2).

Nurses responded that their general IT competency skills are at very good level (mean 4.49, SD 0.64). Domain named Electronic documentation according to structured national headings refers to structured nursing summary, which according to national Act (1257/2015) needs to be saved into the national Kanta services (2019) for every ending care period. According to national regulations nursing summary include the core nursing data: nursing diagnoses, nursing interventions, nursing outcomes, and patient care intensity (Kinnunen et al. 2019). Nurses evaluated their competency in this domain to show also a very good level (mean 4.19, SD 0.70).

Structured nursing documentation using the national nursing documentation model consisting of the nursing process and the FinCC is broadly accepted and in use in different levels of Finnish healthcare organisations. Yet, the model is not in use comprehensively, which shows in nurses' responses (mean 3.94, SD 0.96). The mean of the domain named Patient-related digital work was 3.61 (SD 8.89) which refers to novelty in nurses' work (Table 5.2).

Table 5.2. Variables generated to domains of nurses' informatics competencies (Kinnunen et al. 2019).

Competence variable (scale 1-5)	Domain of nurses' informatics competency	Mean	SD
Documentation of nursing interventions (FiCNI).	Terminology based (FinCC) documentation	3.94*	0.96
Documentation of planned nursing interventions (FiCNI).			
Documentation of the assessment of patient outcomes (FiCNO).			
Documentation of nursing diagnosis (FiCND).			
Support the patient to choose the most appropriate service.	Patient-related digital work	3.61	0.89
Support the patient to take advantage of the potential of electronic self-assessment and self-care.			
The development of e-health services in multi-professional collaboration with the patient and other stakeholders.			
Work in the digital healthcare environment.			
Use of clinical guidelines and other research skills at work.			
To comply with data protection and data security principles in daily work.	General IT competency	4.39	0.64
Application of the ethical rules in eHealth services.			
Basic IT skills (e.g. email, word processing, information retrieval).			
Documentation of patient care summary.	Electronic documentation according to structured national headings	4.19	0.70
Documentation of the aims of the planned care.			
Documentation of the patient care according to the nursing process.			
Documentation of patient care intensity.			
Total		4.0	0.65

* Using a 5-step scale the response options varied from 'poorly' to 'very well', 1 – 5.

Overall, informatics competencies among nurses increased with increased education, the higher HIS user experience, and the experience of sufficient training. In addition, the specific HIS in use was associated with the total informatics competency (Kinnunen et al. 2019).

5.7 Technical support and participation

One of the aims of Finnish eHealth and eSocial Strategy 2020 (Ministry of Social Affairs and Health 2015) is that 'Professionals in social welfare and healthcare sector are involved both in the procurement of the systems and in the planning of operating models'. This was asked by one question 'Have you participated in the development of HIS' and with three options to answer: plenty, little or not at all. Over half (55%) of the nurses had not participated in the development, around 40% had participated little, and less than 10% had participated plenty.

Furthermore, the means and processes for technical support as well as nurses' possibilities to participate in the development of HIS were measured with four claims. The main question was: 'What kind of experiences have you had about giving feedback on the EPR systems you use and about its development?' Nurses in private sector (62%), social sector (60%), and public healthcare centre (53%) know better than nurses in public hospitals (45%) how the feedback system is organized in their organisation. Figure 5.6 summaries nurses' experiences of possibilities to EPR feedback and development.

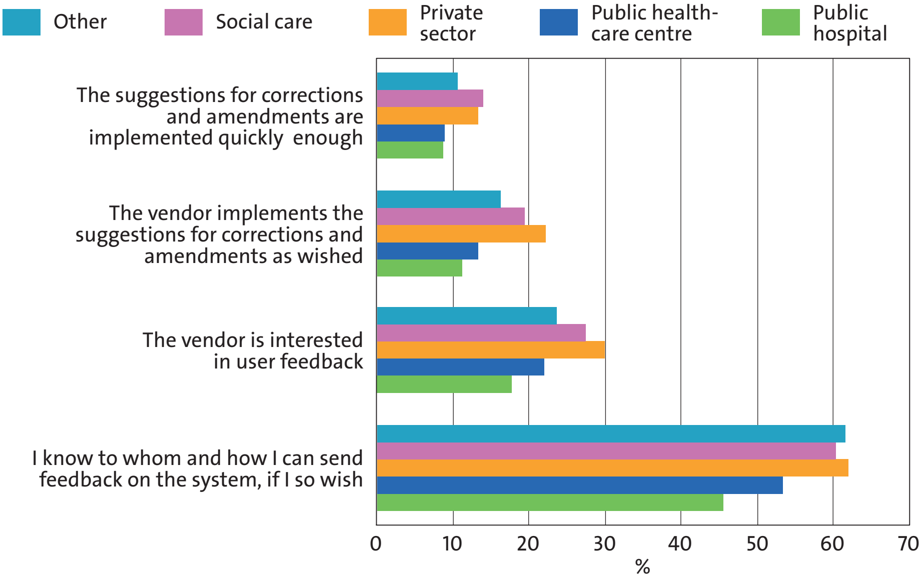

Figure 5.6. Proportion of nurses agreeing about the possibilities to HIS feedback and development.

Collaboration with different vendors seems to be poor. Only 30% of private sector nurses and 27% of nurses from social sector agree with the statement about vendor's interest in user feedback. The suggestions of corrections and amendments of HIS are not implemented according to nurses' wishes or in timely manner. Collaboration with different vendors works best in private sector, and worst in public hospitals. Further, the results highlight the importance of end-user groups to participate in the development of systems as well as to express their needs for improvements. As in earlier studies (Törnqvist et al. 2016, Koivunen & Saranto 2017; Staggers et al. 2018), the results also support that education and guidance to change work practices is distinctly needed when using HIT.

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6 Citizens experiences of e-health and e-welfare services

Hannele Hyppönen, Anna-Mari Aalto

Citizens' readiness to use e-services has increased: of the EU countries, Finland is one of the leaders in terms of proportion of the population internet use (Vainio et al., 2017). Globally, 80% of the population in the developed world used internet in 2016, according to the International Telecommunications Union (ITU) (International Telecommunication Union), and in Finland, the proportion was 92% (Internet Live Stats). According to Statistics Finland, already in 2012, 90% of Finnish 16–74 year olds were using e-commerce technology, and most of them had a home connection (Suomen virallinen tilasto, 2018).

These characteristics coupled with the change in municipal and service structures, aging of the population and the lack of personnel and resources has increased interest of service providers to develop e-services for citizens in social and health care. The development of e-services aims to improve availability, quality and cost-effectiveness of services, enhance disease prevention, early detection and self-care, and improve the continuity of treatment.

Social and healthcare e-services in Finland have been developed by municipalities and hospital districts as local projects since 1980's. Citizen-centred development of e-health and e-welfare services was taken as a starting point in the first Finnish national strategy for applying information technology to healthcare and social welfare in 1995 by the Ministry of Social Affairs and Health (Ministry of Social Affairs and Health, 1995). The strategy was implemented by the Satakunta Makropilotti project (November 1998 – June 2001). Its main goals were to develop and test patient and customer-oriented seamless care and service chains based on IT tools and solutions, self-supporting solutions and self-advisory activities, electronic customer card (so-called electronic Kelakortti) and data protection and information security for social and healthcare clients (Hyppönen et al., 2005).

The Makropilotti goals were too ambitious. Development of the IT solutions and IT-supported new service chains was slower than expected, and all the required infrastructure services (including common classifications) were not available, whereby all the goals were not met. However, the project attained a political consensus on the development of seamless social and healthcare service chains, promoted the crossing of organisational boundaries and laid a foundation for further development of IT solutions. The thorough evaluations offered a good basis for learning for the future (Ohtonen, (edit), 2002; Hyppönen et al., 2005; Koivisto, Loula, 2002; Ripatti, 2001).

The strategy was updated in 1998, placing a specific emphasis on adoption of digital patient and client records at all levels of care, nationwide interoperability between distributed legacy systems, supported by a high level of security and privacy protection (Ministry of Social Affairs and Health, 1998).

In 2010, the Ministry of Social Affairs and Health launched a national program for development of Social and Health Care (KASTE). One of the projects targeted at Information and Information Systems Development (Ministry of Social Affairs and Health, 2012). Alongside these, national Kanta services for citizens started to take form: the first data via the MyKanta Pages for citizens were own prescriptions and their dispensing status. Simultaneously, Ministry of Finance launched a program developing public e-services in Finland (SADe). One of the projects in the program was targeted at public social and healthcare e-service development SADe-SoTe (National Institute for Health and Welfare, 2014). As part of this project, a national survey of citizens' views of e-health and e-welfare was first conducted in 2014 (Hyppönen et al., 2014).

After the SADe and KASTE-programs, national level social and healthcare e-service development continued supported by the National Social and Health Care e-service strategy 'Information to support well-being and service renewal, e-health and e-social Strategy 2020' published in 2015 (Ministry of Social Affairs and Health, Association of Finnish Local and Regional Authorities, 2015). The Strategy was developed to support the nationwide social and health care reform that was postponed to the next government's term of office. The first citizen survey thus supported not only the SADe- and KASTE-programs and development of the national Kanta services for citizens. The results were also fed to the finalization work of the e-health and e-social strategy.

The very first target in the e-health and e-welfare strategy from 2015 was supporting citizens as independent users of e-services. The objectives were that citizens use online services and produce data for their own use and for professionals; reliable information on well-being and services supporting its utilization is available; and information on the quality and availability of services is available in all parts of Finland to support freedom of choice.

This chapter depicts results of the second cross-sectional national survey for citizens (Hyppönen et al., 2018b). It offers a view to the Strategy implementation in 2017, mid-way through the 2015 strategy period. The results will also support planning of the national steering beyond 2020. The data collection in 2017 coincided with national level availability of own medical record data from the public sector via the MyKanta Pages, as well as the eve of first implementations of the national Kanta PHR, where citizens can store and share self-produced health data.

6.1 Data collection and comparison to the 2014 survey

The e-health and e-welfare survey for citizens seeks to answer the following questions:

1. To what extent are citizens using different social and health services electronically?
2. What experiences do citizens have of the electronic social and healthcare services? What are the key barriers of use, and what are the benefits?
3. How would citizens want e-services for social and healthcare to be developed in the future?

There was no ready-made questionnaire that would fit the social and healthcare e-service profile and plans to support e-health development in Finland. Questions from previous surveys conducted in Denmark, US, Canada or Norway did not measure citizens' experiences and needs in relation to all the functionalities that Finland had or was planning to implement. When designing the Finnish form, suitable questions from these questionnaires were selected (Hyppönen et al., 2018b). Danes were already implementing data collection using their own form (Tornbjerg, Bertelsen, 2014), which utilized the Canadian form. The Danish form also partly contained the same variables as the previous surveys in Norway. Selected questions from the Danish, US, Canadian and Norwegian questionnaire formed one source for the Finnish questionnaire, formatted if necessary.

Another source for questions was the Finnish national-level questionnaire-based monitoring of citizens' health, wellbeing and use of healthcare services. This survey has been carried out every year in Finland since 1978. The survey was originally called AVTK "Adult Population Health and Health Behaviour". In 2015, it became part of ATH survey ("Adult Population Health, Wellbeing and Services") (Kaikkonen et al., 2014). This survey changed its name to FinSote survey in 2018. The main goal of this survey is helping municipalities to monitor health, wellbeing and service use of their citizens and to help the municipalities to plan and target their own services. The ATH (FinSote) survey had only two questions related to e-service use: use of the Internet for e-commerce and use of Internet searching for information. We needed information also on citizens' use, usability, utility and needs of different categories of e-health and e-welfare services.

Since e-services form an increasing proportion of the service production and use also in social and healthcare (see chapters 2–3), the citizens' use and views of social and healthcare e-services was planned from the start to become one module in the ATH (FinSote) survey, to be added in the ATH every three years. In 2014 it was agreed with the ATH-survey administrators that the citizen views –survey would test this by using selected ATH survey questions as background questions, developing an e-service module and piloting this entity as a stand-alone survey. The results have been reported in 2015 nationally (Hyppönen et al., 2014) and internationally (Hyppönen et al., 2015). In 2017, the e-service module was implemented as part of the ATH survey (Hyppönen et al., 2018a).

The full ATH questionnaire with the digital module is available in the internet (thl.fi). The full questionnaire in 2017 had 8 background questions, 13 questions on health and wellbeing, + 3 questions on quality of life, + 5 questions on accidents and violence, 16 questions on instrumental activities of daily living, 20 questions on health behaviour, 15 questions on use and opinion on health services. The e-service module in the survey had four topics in the digital module both in 2014 and 2017. The aim in 2017 was to keep the questions as similar as possible as in 2014. A few new questions were added to follow the development of the new e-services. Some questions were also changed since 2014 (specifically the internet use-question to comply with the ATH questionnaire format). In addition, some changes occurred in the ATH questionnaire, changing the background variables of the digital survey. For example, the training variable was asked as classified in 2014, in the ATH survey in 2017, the years of education was asked, on the basis of which a 3-digit variable was constructed. The four topics in the digital module were:

1. Opportunity and competence for electronic communications
    - Access to Internet and e-commerce (2 questions, answer options: yes-no). Formulated differently in 2014 and 2017
    - Self-assessed competence (1 question, 5-stage Likert scale), new question in 2017
2. Mode of use of social and healthcare services (21 services)
    - Service 1–21 (3-point scale: I have not used, I used Traditionally, I have been using electronic means). One new service added in 2017
    - Estimation of number of saved traditional contacts due to electronic usage (____times / v, Open Reply)
    - Use on behalf of others (mode of use, estimation of saved contacts)
3. Barriers to electronic communications (23 claims, 5-step Likert scale)
4. Key Benefits and Needs of Electronic Services
    - Key benefits (13 claims, 5-step Likert scale)
    - Needs for Electronic functionalities (5 groups of functionalities: self-care, service access, data exchange, virtual visits, feedback. 4-step Likert Scale)

The target population of the 2014 survey consisted of 18-year-old residents living in Finland, of which a random sample of 15,000 persons was collected from the Population Register Center. There were 4,015 respondents. In 2017 the target population consisted of 20-year-olds living in Finland, and a random sample of 10,000 people was collected from the Population Register Center. For those over 75 years of age, double picking probability was used in order to guarantee sufficient group size.

The questionnaire was sent by mail to all sampled persons in 2014 as well as 2017. The paper form also contained instructions for answering on the internet. After that, the subjects were targeted 1–3 times by post and reminded to answer.

The total response rate for data collection in 2014 was 35% and up to 47% in 2017. Response rates by age group are compared in figure 6.1. Main differences are due to slightly different sampling criteria in 2014 and 2017. Overall, the poorest respondents were young people, men and the less educated in both years. The response rates were corrected using the weight factors produced by the Inverse Probability Weighting (IPW) method.

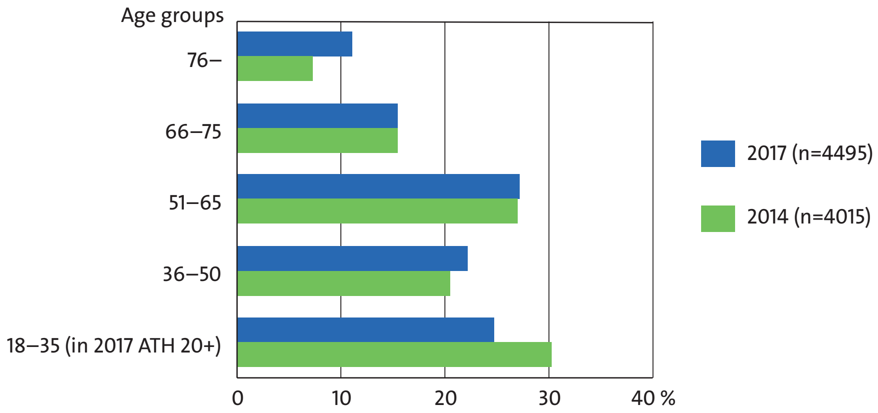


Figure 6.1. Comparison of respondents by age in 2014 and 2017 surveys.

Regionally, by municipality type and respondent morbidity, the response profiles looked very similar in 2014 and 2017 (Hyppönen et al., 2018a).

In 2018, the FinSote (former ATH) survey was carried out without the digital module. However, some e-health indicators were regarded necessary for annual monitoring. The former ATH survey was also revised by extending the service section of the survey to cover population and user opinions and experiences of the functioning of the health and social care system. Also the sample of the FinSote 2018 survey was extended to be representative on the county level (18 counties) to allow the monitoring of counties in their capacity to organize the services. From each county 3,300 persons were randomly selected to the sample. The response rate was 45.3% (n= 26,405 respondents). A stratified random sample was selected from 18 counties with the sample size in each county was 3,300 (2,300 in age group 20–74 years and 1,000 in age group over 75 years), and the different sampling probabilities and nonresponse were handled using inverse probability weights calibrated to the corresponding population size.

For the 2018 FinSote survey, the 2017 digital module question on e-service benefits was condensed to four benefit types. Thus, in 2018, the respondents were first asked whether they had access to internet at home, workplace, library or some other place (yes/ no) and to online banking codes or mobile certificate for electronic identification online (yes/no). The other question related to digital services was: ’What kind of experiences do you have of the internet from the perspective of the following issues?’ a) searching information about illnesses, symptoms or healthy ways of life, b) support provided by peer groups (e.g. weight loss group), health advice or other self-care (NOTE: referred as virtual support groups in the following), dealing with social and health services (e.g. scheduling an appointment, prescriptions, laboratory results, decisions on social welfare services or benefits) d. comparing services units or providers (quality, waiting times, prices). The response alternatives were 1) very useful, 2) somewhat useful 3) useless, 4) I have never used it

The results of these digi-questions from the 2018 FinSote survey have been reported in chapter 6.7.

6.2 Opportunity and competence for e-service use

In 2017, use of Internet and e-commerce was measured with questions: Do you use the internet:

- to retrieve data (e.g. schedules, health information, etc.)
- for electronic transactions (e.g. with online banking, Social Insurance Institute, tax office, ticket service, municipal services etc.)

The answer options for the youngest age group were yes, no. For the elder age group, the answer options were: I use myself, I use assisted, I do not use.

In 2014, when the digital survey was conducted for the first time as a separate survey, the question was: “Do you have (at home, at work or at work, or at place of study):

- Internet connection
- IDs for online transactions (e.g., online banking IDs)

The answer options to these questions were yes, no to all age groups.

Due to the different formulation of the question in 2017 and 2014, it is not possible to compare results. However, the magnitudes of the use of internet were very similar both years: In year 2017, 87% of the younger age groups used the internet to retrieve data, in 2014 altogether 89% of respondents had internet connection. In 2017, 86% of younger age groups used electronic services requiring identification, and 37% from the oldest age group (by themselves or assisted). In 2014, 88% of respondents had ID’s for online transactions. Answers to older age groups in 2017 showed that almost two-thirds did not use electronic transactions at all, a third used, some of whom were assisted.

6.3 Proficiency of use of e-services

Proficiency of use of e-services was not queried in 2014. In 2017, the question was: What is your assessment of your ability to use the internet and online services (computer or mobile)? Response options: do not use (1), novice (use with assistance), use the basic services independently, use fluently many e-services, expert (can teach others) (5).

Overall, 78.5% of respondents estimated having enough competence to use e-services independently. However, there were big regional differences, from 60% being able in Ostrobothnia to 86% being able in Uusimaa. Age was a significantly associated with self-assessed skills level ($p < 0.001$).

6.4 Mode of social and healthcare service use and use of online services

The 2017 survey digital module in the questionnaire listed 21 different services or functionalities, for which the respondent was asked if he/she had used the service / functionality during the last year, and if so, how.

The most commonly used functionalities (hence also the highest potential for digitalisation) were obtaining laboratory or other research results, visiting the doctor or nurse, searching for health or well-being information, renewing a prescription and booking (half or over had used them during the past year). Searching for needed services, reviewing own patient data (medical records), and monitoring own well-being was also quite common (over 40% of respondents had used these services / functions over the past year) (Hyppönen et al., 2018a).

The full potential for digital use of the most commonly needed social and healthcare functionalities was not yet realized in 2017, although electronic use of some functionalities had increased: a total of 68% of respondents had used at least some functionality electronically in 2017. This was 10 percentage points more than in 2014. The most commonly used functionality in both years was information retrieval electronically (Figure 6.2). One third of the respondents had received traditionally (paper or face-to-face) research results, asked for a prescription renewal, or measured their own health. A quarter had used these services electronically. Half of the respondents had physically met doctor or nurse, but only 2% had done so electronically (remote visit). Information retrieval about health, search of services and viewing own medical record were the only services where electronic means was a more common mode of use than the traditional way.

Viewing of laboratory results and clinical notes as well as prescription renewal electronically are functionalities of the MyKanta Pages, which were implemented after 2014. This explains the big increase in the electronic use of these functionalities. Also proportion of citizens having booked electronically an appointment has increased clearly from 2014. Increase in electronic use of other functionalities has been more modest.

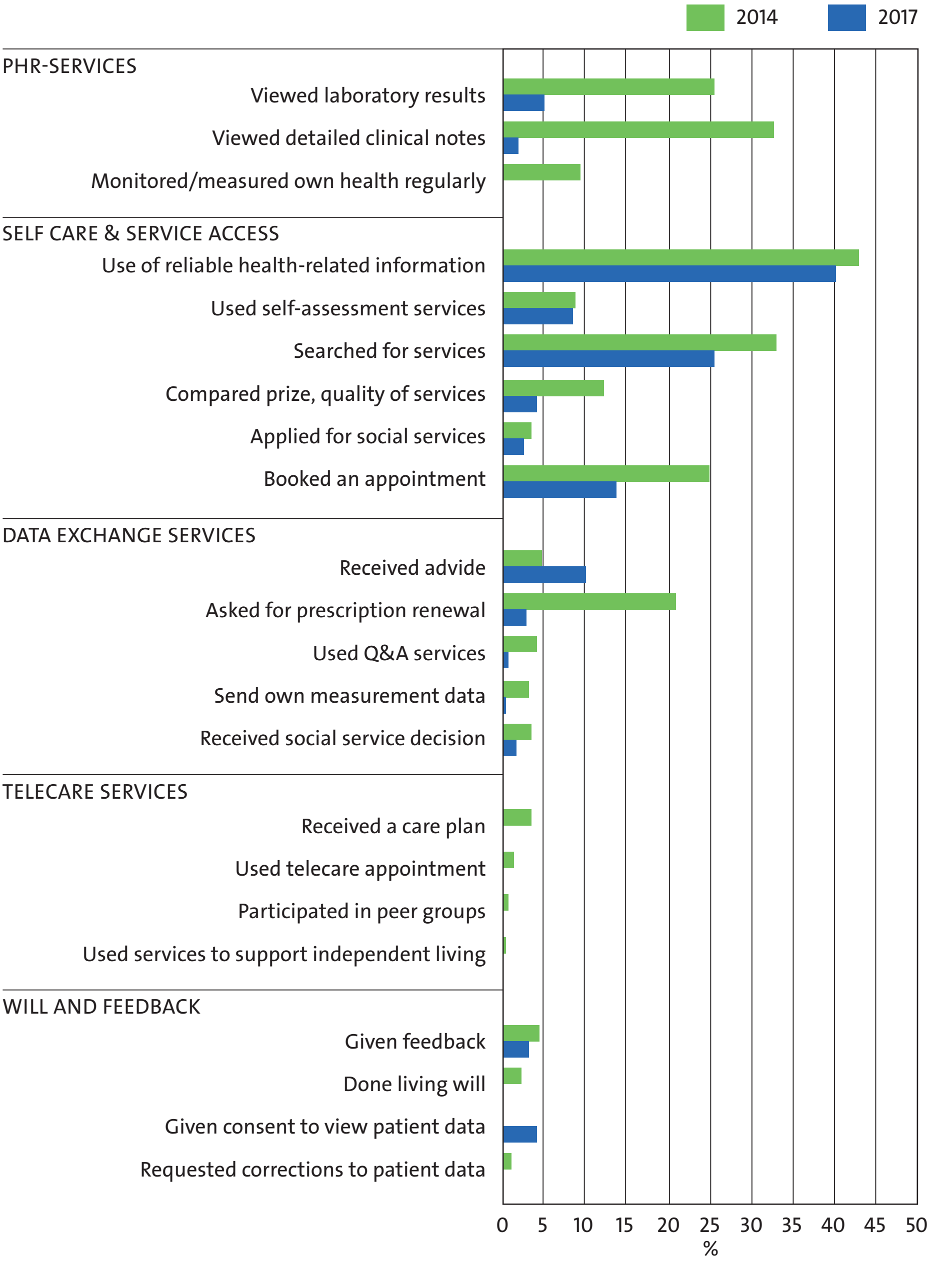


Figure 6.2. Change in electronic use of social and healthcare functionalities from 2014 to 2017.

Regional differences in use of electronic services were statistically significant at 0.05 level. The most active users of e-services in 2017 were residents of Uusimaa, Lapland and Southwest Finland (70% or over of the respondents in these areas reported using some electronic service), the least number of users of digital services was in Åland. Åland is a Swedish-speaking region, which may partially explain the lower proportion of users of e-services, for which Finnish has been the primary language.

To assess what factors are associated with use, a new dichotomy variable was created from the 2017 data, grouping those who had used at least one of the social and healthcare functionalities electronically (0 = nonuser, 1 = user). Age, education, long-term illness, state of health, quality of life, digital skills, fully agree with at least one of the obstacles and the living area were significantly connected to the use of electronic services (Pearson's correlation coefficient p <0.01).

To determine how these factors predict the use of electronic services, a binary logistic regression analysis was performed (Figure 6.3).

1 – Living region Lapland (Ref.Southern Finland) **2** – Mother tongue Russian (Reference Finnish) **3** – Education level high (Ref. low) **4** – Chronic illness No (Ref. Yes) **5** – IT proficiency Beginner – need help (Ref. no skills) **6** – IT proficiency Basic skills for independent use (Ref. no skills) **7** – IT proficiency Fluent use of needed services (Ref. no skills) **8** – IT proficiency Expert – can teach others (Ref. no skills) **9** – Accessibility and attitude as barrier disagree (Ref. agree) **10** – Availability as barrier disagree (Ref. agree)

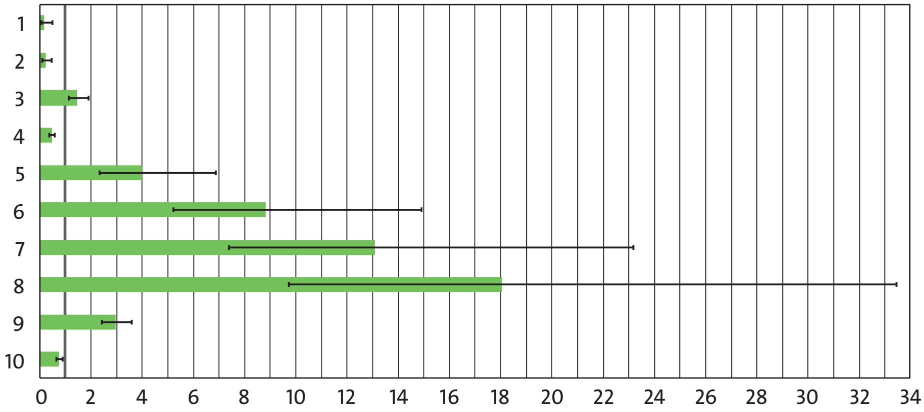


Figure 6.3. Variables with significant odds for predicting use of electronic services (with 95% confidence intervals). Odds (bars in the figure) and confidence intervals (lines in the figure) with values above 1 show significantly higher probability for using e-services compared to the reference groups. Odds and confidence intervals below 1 show significantly lower probability compared to the reference groups.

Controlling for all other variables, age did not – contrary to assumptions – become a significant predictor of use of electronic services. By far the strongest predictor of use of e-services was digital literacy: the more proficiency respondents had, the higher was the odds for using e-services. Probability of respondents with expert-level proficiency was 18 times higher compared to respondents without skills. Accessibility and attitude as an obstacle was also a significant predictor of e-service use: those disagreeing that this was a barrier were 3 times more likely to use electronic services compared to those agreeing. Those with the highest education were 1.4 times more likely to use electronic services compared to people with lowest education level. Those who did not have a chronic illness were 0.5 times less likely to use electronic services compared to those with a chronic illness. Mother tongue also played a role: those who spoke Russian as their mother tongue were 0.22 times less likely to use e-services than native Finnish speakers. In addition respondents from Lapland were 0.16 times less likely to use e-services than respondents from Southern Finland. Those disagreeing with availability – barrier group were, however, 0.8 times less likely to use e-services than those agreeing.

6.5 Experienced benefits of e-services

To assess citizen views of benefits of e-services, a list of 21 benefits anticipated from e-services or documented in literature was collated for the 2017 digimodule, and formulated into claims with 5-point Likert scale. Main benefits experienced by respondents were useful reminders of appointments (86% of respondents agreed), support for service selection and time or money savings (78% of respondents agreed or agreed fully). Most of the respondents (75%) also saw that e-services support communication between client and professional. Claim about e-services supporting tailoring of services to individual clients gained the least agreement (Figure 6.4).

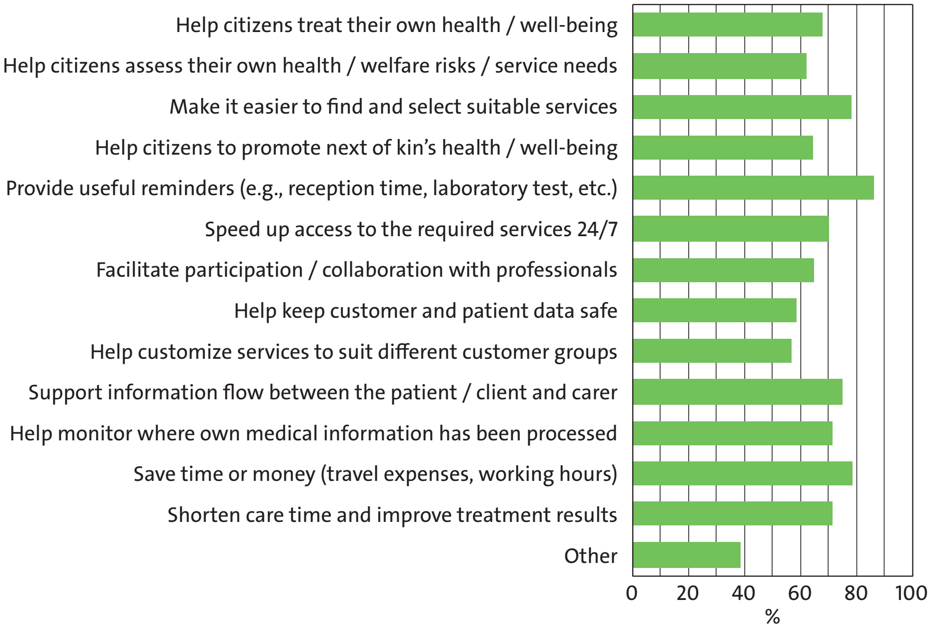


Figure 6.4. Proportion (%) of respondents agreeing or fully agreeing with the e-service benefit claims.

We asked those who had used the listed e-services to estimate the number of traditional contacts saved during the past year due to e-service use. Further, they were ask to assess time or money saved. Mean use of individual e-service functionalities was still very modest (Figure 6.5). The figure shows, however, the great potential of savings especially due to self-monitoring – although the variance was very big, mean number of saved traditional contacts per year was up to 27 visits per year. It is understandable for chronic care patients, who are able to measure and document such as blood sugar level or weekly INR at home with an electronic app, without the need to travel anywhere for measurements and treatment adjustments.

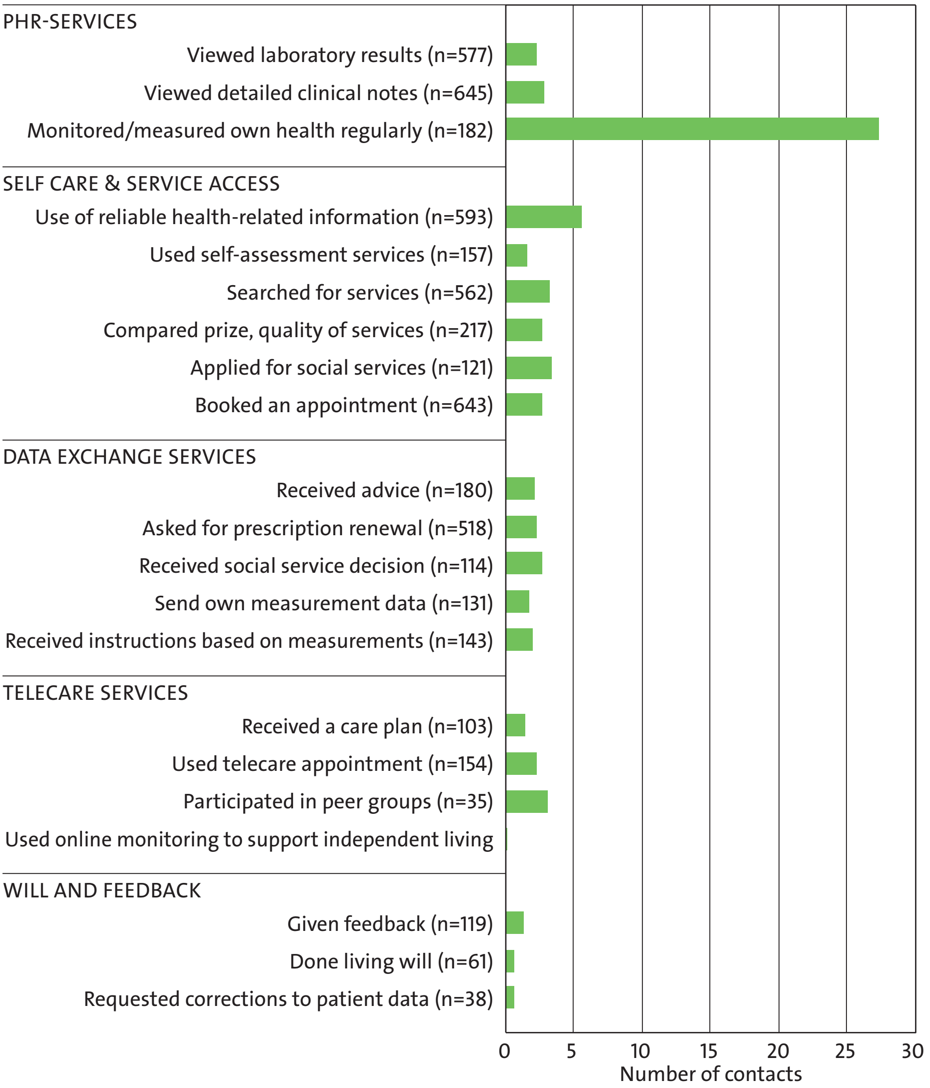


Figure 6.5. E-service users' estimated number of traditional contacts saved due to e-service use in 2017.

Reliable health information online was estimated as the second biggest saver of traditional contacts, mean saving being 5.6 contacts per year.

6.5 Citizens' barriers of uptake and use of e-services

Barriers to electronic transactions were mapped with 23 claims (Likert scale 1 = totally agree, 5 = totally disagree) in the 2017 ATH-survey digi-module. The barriers were grouped together with factor analysis to four barrier categories (Figure 6.6). The barrier groups, their reliability, means and standard deviations were:

- Availability of electronic services ($\alpha = 0.82$). Mean 3.59, SD 1.02
- Trust in electronic services ($\alpha = 0.89$); Mean 3.25, SD 1.19
- Quality of electronic services ($\alpha = 0.88$); Mean 3.03, SD 1.08
- Accessibility/ attitudes to use electronic services ($\alpha = 0.90$);
  Mean 4.17, SD 0.94

Over half of the respondents (54%) agreed fully with at least one barrier. The 'Quality of e-services' was the most prominent barrier group in 2017 as well as 2014. It included the most common obstacle in 2017, as in 2014: belief that **face-to-face visits cannot be replaced by an electronic contact.** In 2017 68% of respondents agreed or agreed totally, and the proportion had increased since 2014 (63% of the respondents agreed). An even bigger increase as a barrier (10% units) can be seen for the claim **Non-medical aspect of my care are not noted if I do not meet the service provider face to face.** Only one barrier in this group – proportion of respondents agreeing that e-services slow down access to services' – did not increase from 2014 to 2017.

The 'Availability of e-services' -barrier Group showed more modest agree rates than Quality of e-services. There was one claim which showed reduction: Barrier **The services I need are not available electronically** – proportion of respondents agreeing reduced from 6 units of percentage, from 25% in 2014 to 19% in 2017. In this group, there were two claims not surveyed in 2014.

The 'Trust'-barrier group showed bigger agree-rates than Availability-group. All claims in this group showed slight increase in proportion of respondents agreeing. The difficult-to-understand terms of use was seen as the biggest barrier in this group, by 46% in 2017, and 42% in 2014 agreeing.

The 'Accessibility and attitudes' -barrier group showed lowest agree-rates. Formulation of the claim **e-services I need are not accessible to be due to reduced functional ability'** was changed, and results from 2014 and 2017 are not comparable. Claim **e-services are difficult to use** showed biggest increase in this barrier group. Proportion of respondents agreeing with claim **e-services do not bring me any added value** showed no increase.

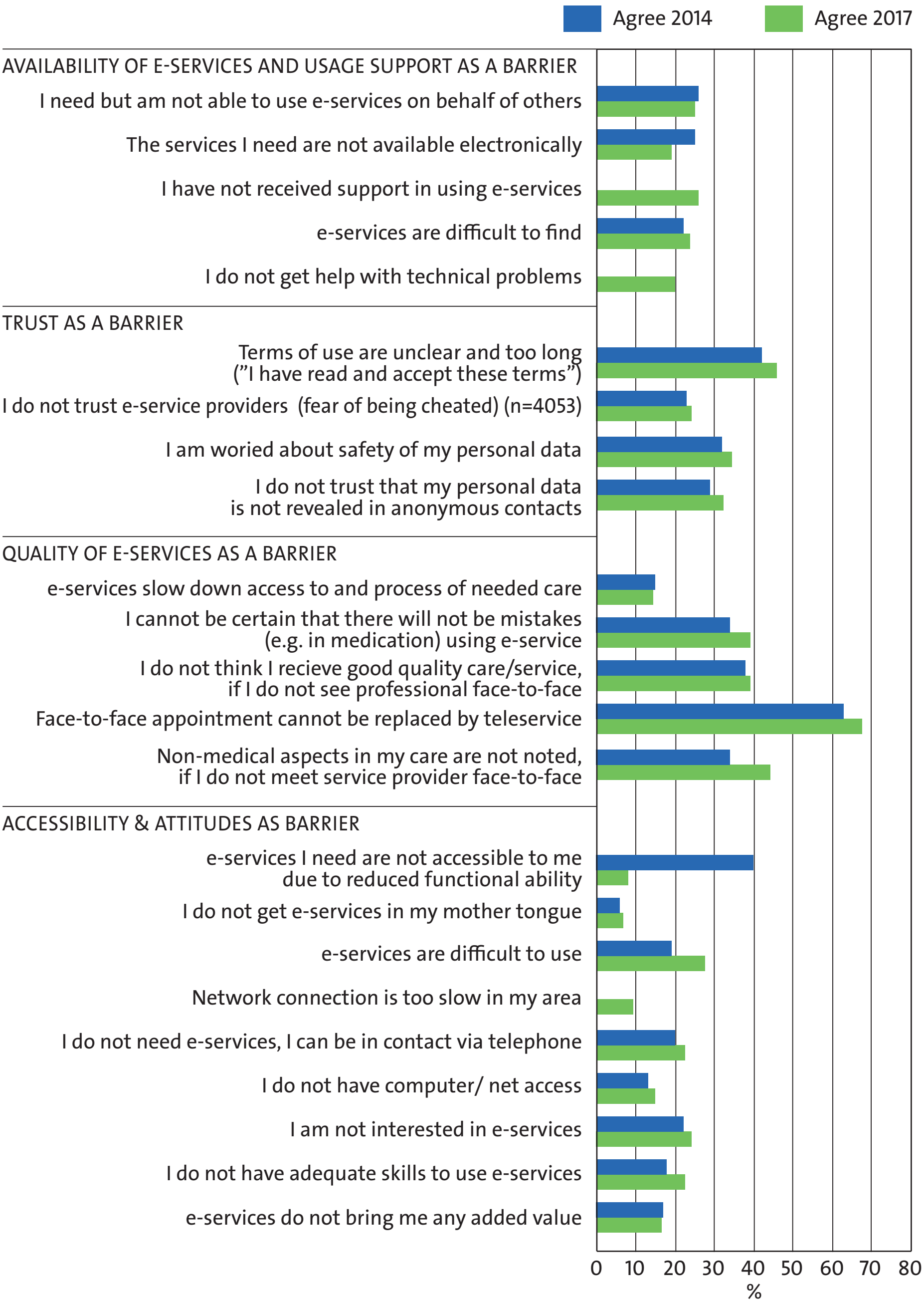


Figure 6.6. Barriers by barrier groups in 2014 and 2017. Proportion of respondents agreeing or agreeing fully.

To analyse predictors of barriers in 2017 data, a new variable was formed grouping those, who fully agreed with at least one of the barriers (0 = did not fully agree with any barrier, 1 = fully agreed with at least one barrier). Significant predictors are depicted in figure 6.7. With all other variables constant, advanced users experienced barriers 0.31 and expert users 0.27 times less likely compared to those without skills. Only respondents with novice IT skills (needing help to use e-services) did not have lower or higher odds for fully agreeing with any barrier.

The only other predictor for experiencing barriers was age: Respondents aged 75+ experienced barriers 1.7 times more likely than younger respondents.

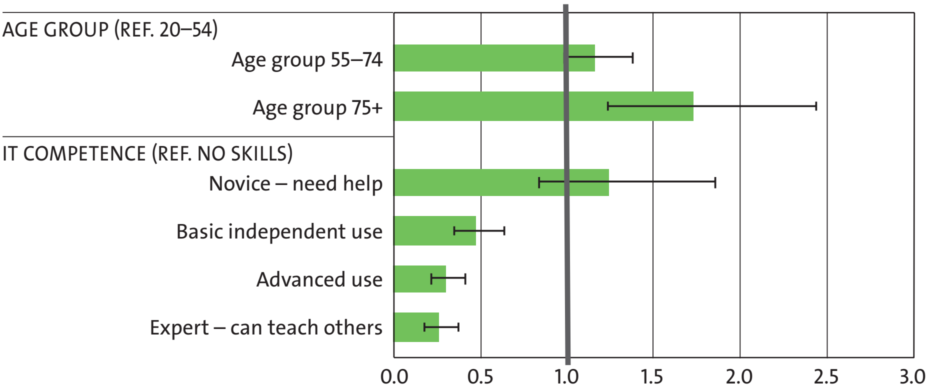


Figure 6.7. Age and competence as significant predictors of fully agreeing with at least one barrier. Odds (bars in the figure) and confidence intervals (lines in the figure) with values above 1 show significantly higher probability for experiencing barriers compared to the reference groups. Odds and confidence intervals below 1 show significantly lower probability for experiencing barriers compared to the reference groups.

6.6 Online services needed

The final question in the ATH survey digi-module focused on types of services that respondents felt they needed. Individual functionalities were not listed in 2017 as was on the 2014 form. Instead, we grouped the functionalities to five e-service categories ranging from self-care, service selection and access to medical data to interaction with professionals and will expressions. The question listed these five categories, with answer options “fully unnecessary; somewhat unnecessary; not unnecessary nor important; important; very important”. The variables were recoded to form three groups: the two first options were combined to form group ’unnecessary’ and the two last options were combined to form group ’important’ (Figure 6.8).

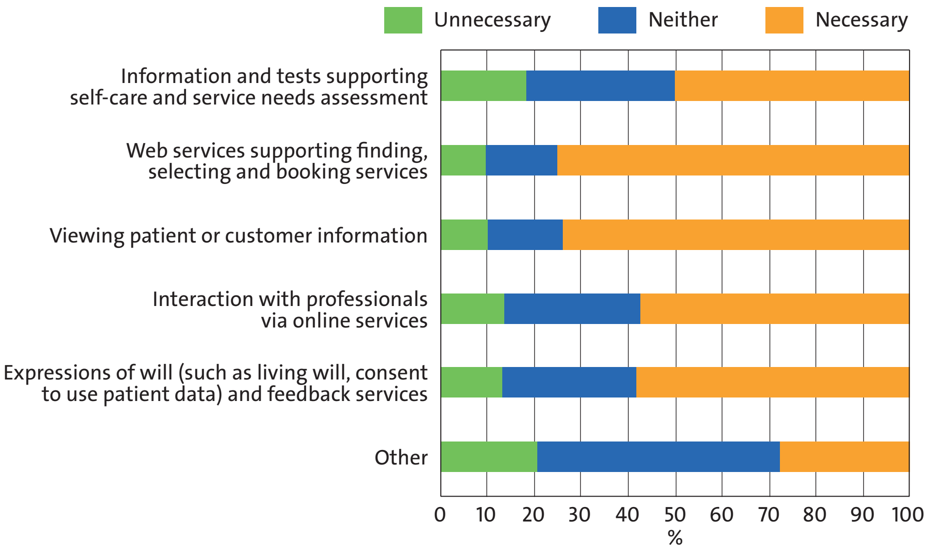


Figure 6.8. Importance of different e-service categories.

Web services supporting health and social service finding, selection and booking were seen as the most important category of e-services in social and healthcare (75% of respondents regarded it important). Web services for viewing one's own patient data (including test results, prescriptions and detailed clinical notes) was seen almost as important (74%). There was also the lowest number of respondents regarding these e-service categories as unnecessary. Over half (58%) of the respondents saw electronic interaction with professionals as well as electronic expressions of will important, with a less than 15% regarding them unnecessary. However, almost one third selected neither important nor unnecessary. Electronic support for self-care (e.g. reliable online health information, health checks and tests) was only seen important by half of the respondents, with nearly a fifth regarding these e-services unnecessary, and one third having selected neither necessary nor unnecessary.

6.7 The 2018 FinSote survey results on digital service system

The four types of benefits of e-services in social and healthcare queried in the in 2018 FinSote survey were: 1) searching information from the internet (on illnesses, symptoms, healthy ways of life) 2) participation in virtual support groups or counselling (e.g. weight loss support groups, advice in health issues, self-care) 3) dealing with health and social service (scheduling an appointment, viewing prescriptions or test results, receiving a decision on social service of welfare benefit) 4) comparing service units or providers (quality, waiting-times, prices). The response alternatives were 1) very useful 2) somewhat useful 3) useless 4) I have not used.

Two types of analyses were done from the respondents who had internet connection and used at least some of the services electronically: 1) predictors of use of different e-service types and 2) predictors of their usefulness.

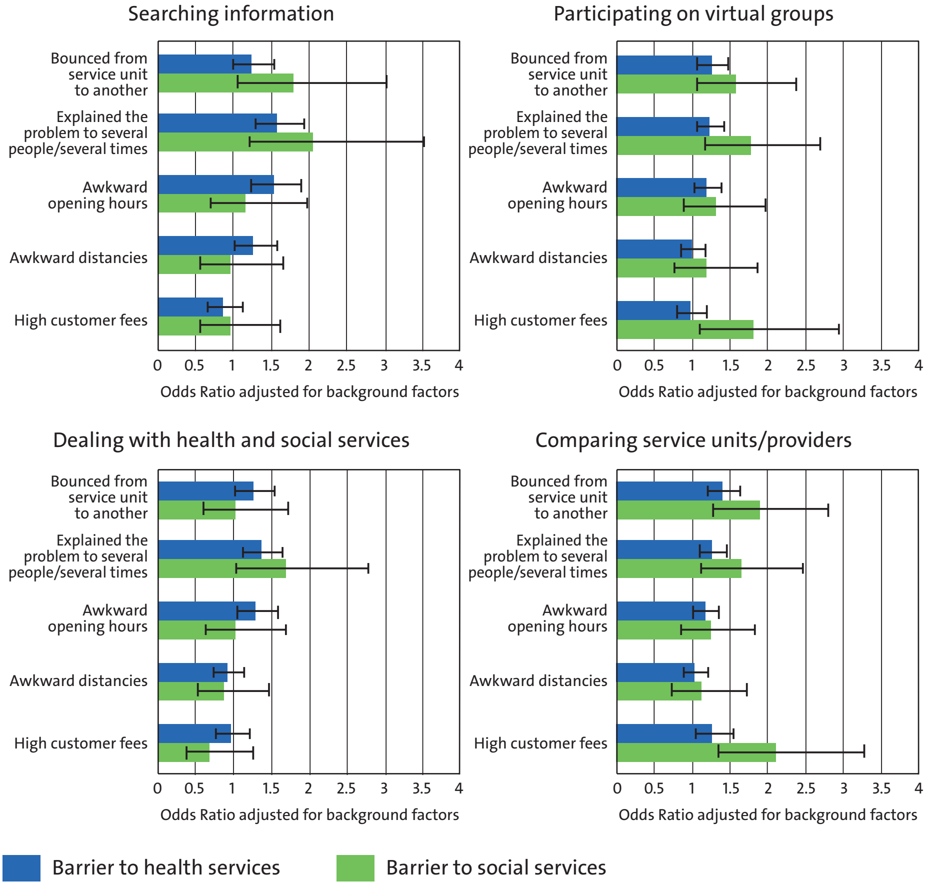
6.7.1 Predictors of use of e-service types

Eighty four per cent (84%) of those who had an access to internet had used it for searching information on health and welfare, 48% had participated on virtual support groups in health related issues, 80% had used internet in dealing with health and social services and 49% in comparing service units or providers.

When all background factors were taken into account simultaneously, internet was used for searching **information** more often by women, younger respondents and those with higher education, while those retired used internet less of for searching information compared to those working. Also those who had suffered financial hardship and users of health services searched more often than others from internet information on health and well-fare. Using internet for **participating in virtual groups or counselling** in health and welfare related issues was more common among women and younger respondents, those with higher need for services and users of health and social services. **Dealing with services via internet** was also more common among women and younger respondents but in also among those with higher education, those with chronic illnesses and users of health services. Retired persons used internet less often for dealing with services compared to those working. Internet was used for **comparing services** more often by younger respondents but less often by those with higher education. Furthermore, those with higher need for services used internet more often for comparing services. Comparing services in internet was more common in urban than in rural areas.

The use of internet in issues related to health and social care was also examined in terms of barriers to attainability of health and social services in general. The users of health services and social service were asked in the FinSote 2018 survey, whether the following factors had interfered with them receiving treatment or social welfare services during the past 12 months: 1) being bounced back and forth form service unit to another 2) having had to explain one’s situation to several people or several times (referred as poor information transfer between professionals in the following) 3) awkward opening hours 4) awkward distances and 5) high user fees.

The associations between perceived barriers to health and social services and use of internet in the 4 benefits related to health and social care are depicted in figure 6.9. The associations are adjusted for above mentioned background factors (see also appendix table 1). All four types of use internet were more common among those who had been bounced between service units or who had suffered from poor information transfer in both health and social services. Those who experienced the opening hours in health services awkward used more often internet for all purposes. Those who suffered from awkward distances in health services used more often internet on searching information. Finally, suffering from high user fees in both health and social services was related to use of internet for comparing services and suffering from high user fees in social services also to searching information form internet.



Searching information

Participating on virtual groups

Dealing with health and social services

Comparing service units/providers

Figure 6.9. Use of internet in issues related to health and social care according to perceived barriers in attainability of health and social services. Odds ratios (OR) adjusted for socioeconomic factors, chronic illness and financial hardship, use of health and social services and urbanization of the living area. OR and confidence interval (CI) >1 means that those having experienced the barrier used more often internet compared to those not having experienced the barrier, OR and CI<1 means that those having experienced the barrier used internet less often.

6.7.2 Predictors of usefulness of e-services

Figure 6.10 shows the assessments of usefulness of different types of internet use in issues related to health and social care among those who had used internet for a purpose in question. Dealing with health and social services (e.g. scheduling an appointment, viewing prescriptions or test results, receiving a decision on social service of welfare benefit) was the most favoured mode of internet use, since more than half of the respondents assessed it as very useful. In the use of internet for other purposes one third of respondents considered them as being very useful. However, only a minority of users of internet for each purpose considered them as useless (2–11%).

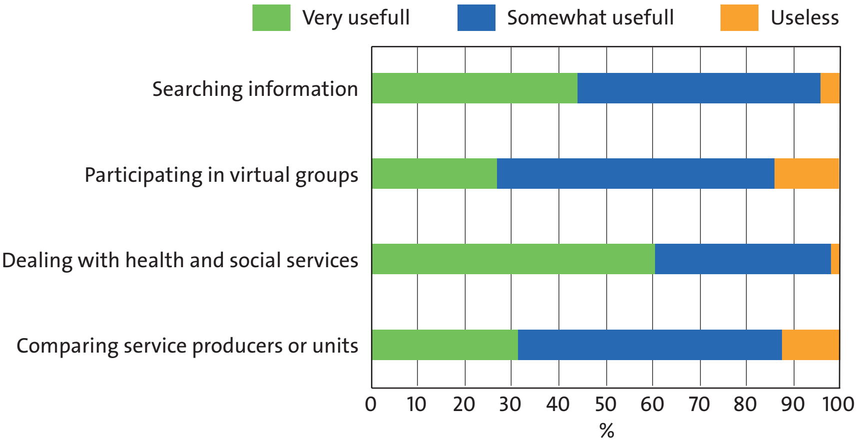


Figure 6.10. Perceived usefulness of internet in issues related to health and social care (among users for each purpose).

Internet was found useful ('very useful' as a criterion) for all purposes more often by women and younger respondents. In addition those with higher education and users of health services assessed internet more often useful in searching information. Furthermore, those with higher education, users of social services and those living in urban areas found internet more often useful in dealing with services. Comparing services was also found more useful in urban than in rural areas.

When perceived usefulness of four types of internet use was examined in terms of perceived barriers in attainability of health and social services (all background factors held constant) those who had suffered from being bounced from a service unit to another or from awkward opening hours in social services assessed participation in virtual groups more often as useful (Figure 6.11). Experiences of all barriers in attainability of health services were related to finding dealing with services in internet less useful. In social service experiences high user fees as a barrier to service use were related to finding dealing with service in internet as less useful. Finally, those suffering from being bounced between services or awkward opening hours and distances in health services found comparing services less often useful than others.

However, those who had suffered from high user fees in health or social services assessed dealing with services via internet as less useful. Furthermore dealing with services via internet was assessed less often very useful by those who had suffered from awkward opening hours and distances in health services. Finally, those who reported problems in health services related to awkward opening hours and distances and being bounced from healthcare unit to another assessed internet less often useful in comparing service units or providers.

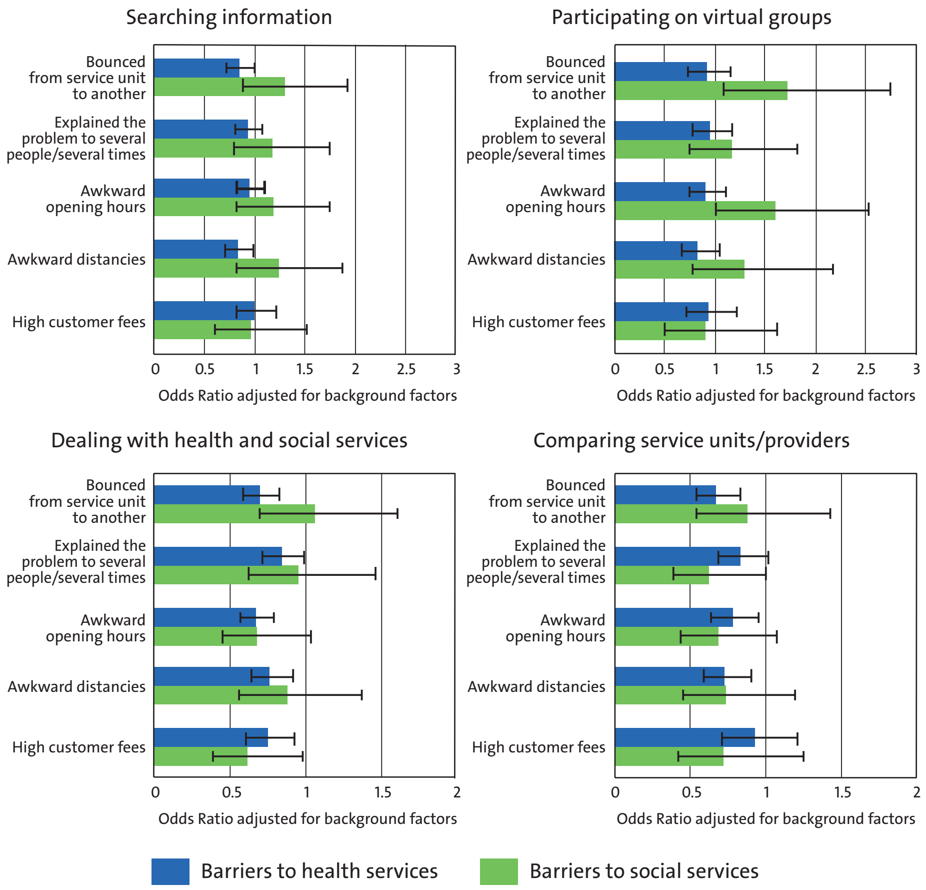


Figure 6.11. Perceived usefulness (very useful) of internet use in issues related to health and welfare according to barriers in attainability of services. Odds ratios (OR) and confidence intervals (CI) adjusted for background factors (see table 2 in appendix). NOTE: OR and CI >1 means that assessment of 'very useful' is more common among those reporting the barrier. OR and CI <1 means that assessment of 'very useful' is less common among those reporting the barrier.

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7 Using the database to assess the Strategy goals

Hannele Hyppönen, Tuulikki Vehko

This chapter presents examples of the STePS results depicting the current e-health and e-welfare situation in Finland against the strategic objectives from 'Information to support well-being and service renewal – eHealth and eSocial Strategy 2020' (Ministry of Social Affairs and Health, 2015). Each of the objectives were measured with at least one survey question, mainly there was a battery of questions for each objective, which were reported as single variables and composite variables.

The dynamic database views are used as selected windows to illustrate how results of measures can be viewed e.g. by region or EHR-system, and how the background variables can be used to filter the results. Detailed instructions to use the database reporting tool are presented in THL website (THL, 2017).

7.1 Citizens as service users – Doing it yourself

The key strategic objectives for this target area are:

- e-services and information on cost, quality and availability of services is available to the citizen
- citizen use electronic services and generate information for own and professional use
- e-services support citizens in life management, prevention of health problems, self-assessment of service needs and self-sufficiency

The first objective was measured by the e-health and e-welfare availability surveys (databased reports under construction) with list of key e-services and the types of information available for citizens. Detailed results are depicted in chapter 2.4 and 3.4.

The second objective was measured by the citizen survey list of e-health and e-welfare services asking, which of them the respondent had used electronically during the past year, and a composite variable was generated of respondents having used at least one e-health or e-welfare service electronically. The database view with results on a regional map shows the regional differences in this or any other selected measure and selected year. Regional result can be viewed colour or by number by bringing the cursor on top of the region on the map. All figures and tables can be exported in different formats for own use (Figure 7.1).

Social and health care digitalisation - Citizens

Topic: Use of e-services

Measure: eService users %

Time: 2017

Social and health care e-services: Results by measure on a regional map

Source: Monitoring Social and Health Care Information Systems and Services (STePS, STePS 2.0)

Read more

Measure: eService users %

Year: 2017

Whole country: 70,2

eService users %
57,1–62,9
62,9–65,8
65,8–68,3
68,3–71,1
71,1–77,4

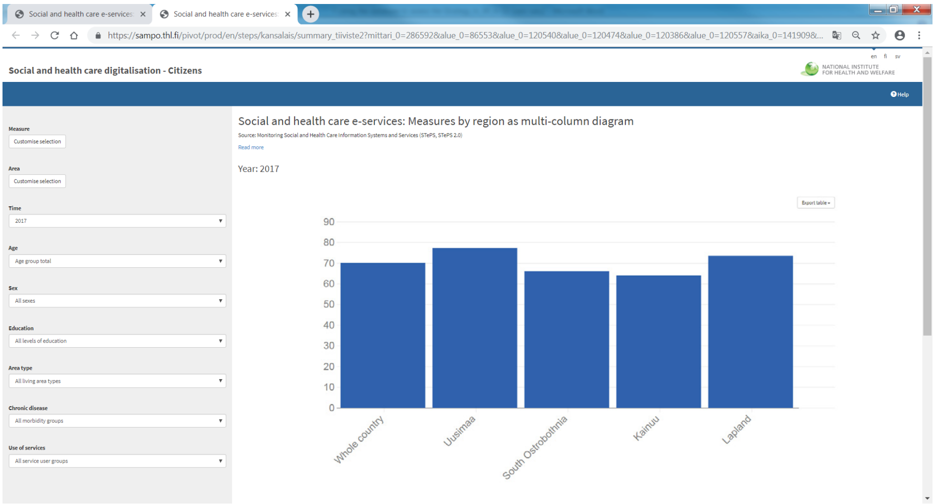
Description

Proportion of respondents (%) who used at least one of the 21 listed services electronically over the past year

The percentages are unweighted in 2014, weighted in 2017. The measure has not been calculated if n is less than 30

Figure 7.1. Social and healthcare e-service users by region in 2017.

Each variable, for example proportion of respondents having used e-health or e-welfare services, can also be viewed by region on a bar chart, where the user can select regions of interest and filter results by multiple background variables (Figure 7.2).



Social and health care digitalisation - Citizens

Measure: Customise selection

Area: Customise selection

Time: 2017

Age: Age group total

Sex: All sexes

Education: All levels of education

Area type: All living area types

Chronic disease: All morbidity groups

Use of services: All service user groups

Social and health care e-services: Measures by region as multi-column diagram

Source: Monitoring Social and Health Care Information Systems and Services (STePS, STePS 2.0)

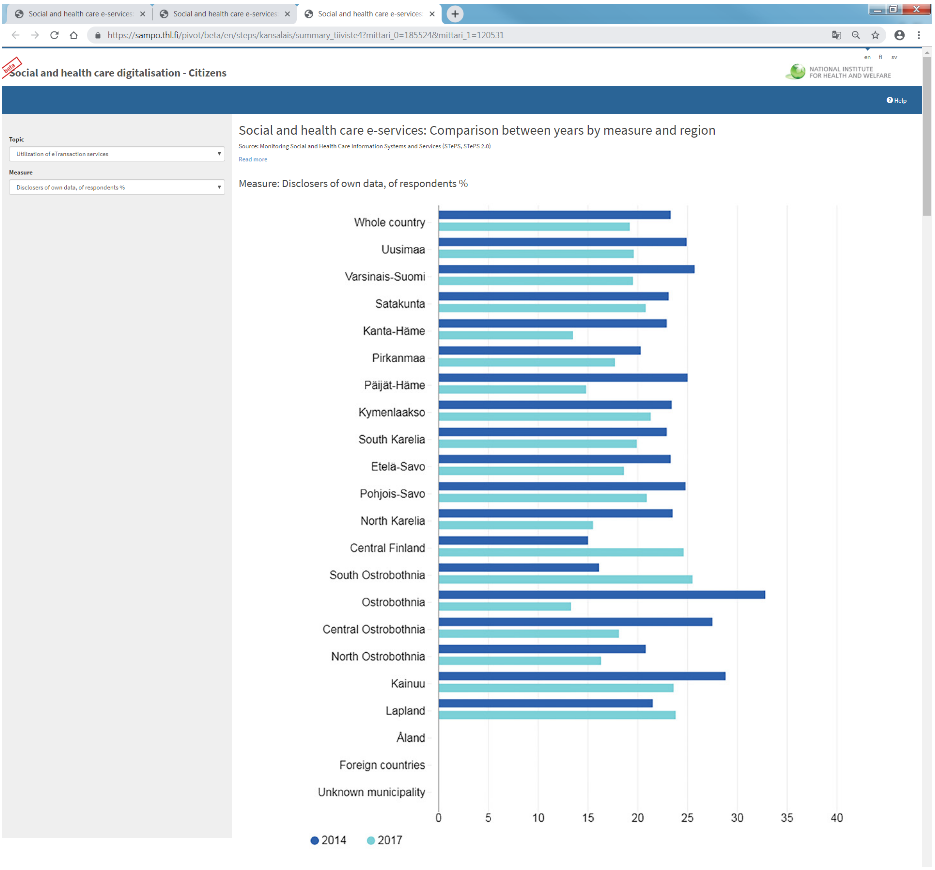
Read more

Year: 2017

Figure 7.2. E-service users by selected regions on a bar chart view with customizing options on the left column.

Another bar chart view compares measures by region to the whole country, placing better scoring regions above the whole country (average) and lower scoring regions below the average. Another option is also to view results of all measures by time on a table view.

There is also a possibility to compare change in each measure by region: e.g. proportion of respondents having generated information (client history or measurement data) for professional use is depicted in figure 7.3. It is easy to see from the view that citizens provide data increasingly for professional use, but there are clear regional differences. In this view, the user can select the topic and measure of interest.


https://sampo.thl.fi/pivot/beta/en/steps/kansalais/summary_tiiviste4?mittari_0=185524&mittari_1=120531

Social and health care digitalisation - Citizens

Topic: Utilization of eTransaction services

Measure: Disclosers of own data, of respondents %

Social and health care e-services: Comparison between years by measure and region

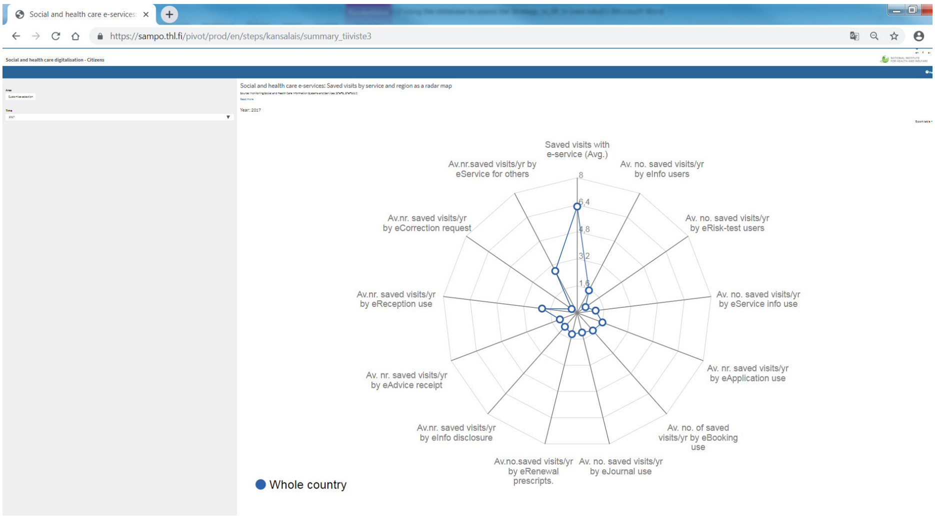
Source: Monitoring Social and Health Care Information Systems and Services (STePS, STePS 2.0)

Measure: Disclosers of own data, of respondents %

Figure 7.3. Respondents disclosing own measurement or client history data to carers by region and year.

To illustrate measures for the goal of e-service benefits, there is an additional view: a radar diagram. For citizen services, it depicts respondents' estimates of number of saved traditional contacts due to using different e-services. In this view, the user can select the regions of interest and the year of interest. Again, results can be exported for own use. Figure 7.4

More information on traditional contacts saved, barriers and benefits of e-service use can be found on Data brief report in Finnish (Hyppönen, et al. 2018).



Social and health care e-services: Saved visits by service and region as a radar map

Year: 2017

Figure 7.4. Saved visits by service and region on a radar map.

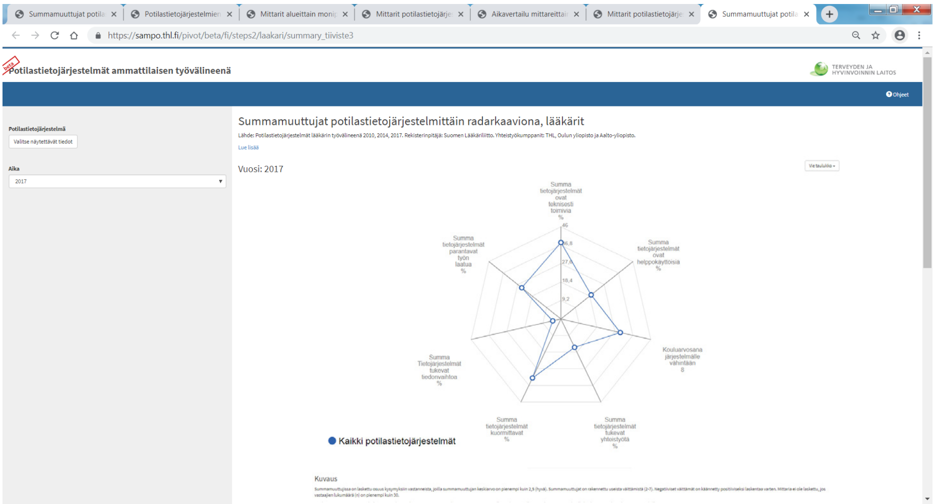
7.2 Professionals – Smart systems for capable users

The key strategic digitalisation goals from the point of professionals are:

- Professionals have a comprehensive access to information systems supporting work and operational processes
- Usability of systems and tools support work
- Professionals are involved in the procurement of systems and the design of operating models
- The knowledge management skills of professionals and providing good training in new applications for both information systems and operating models is strengthened.

The first goal is measured by the availability surveys. Database reporting of the results is still under construction. Detailed results related to the availability of information systems are reported in chapters 2.2–2.3 and 3.2–3.3.

Usability was measured with several dimensions in physicians' and nurses' surveys: technical quality, information quality, ease of use, inter-organisational collaboration, cross-organisational collaboration, benefits, and feedback. Each of these dimensions consisted of several measures. The scale has been validated recently (Hyppönen, et al. 2019). These dimensions can be viewed as composite variables by EHR-system on a radar map (Figure 7.5, physician survey, in Finnish, database translation in progress) or the measures can also be viewed individually on selected other views (bar charts, table or regional map).



Potilastietojärjestelmä

Valitse näytettävät tiedot

Aika

2017

Summamuuttujat potilastietojärjestelmittäin radarkaaviona, lääkärit

Lähde: Potilastietojärjestelmät lääkärin työvälineenä 2010, 2014, 2017. Rekisterinpitäjä: Suomen Lääkäriliitto. Yhteistyökumppanit: THL, Oulun yliopisto ja Aalto-yliopisto.

Lue lisää

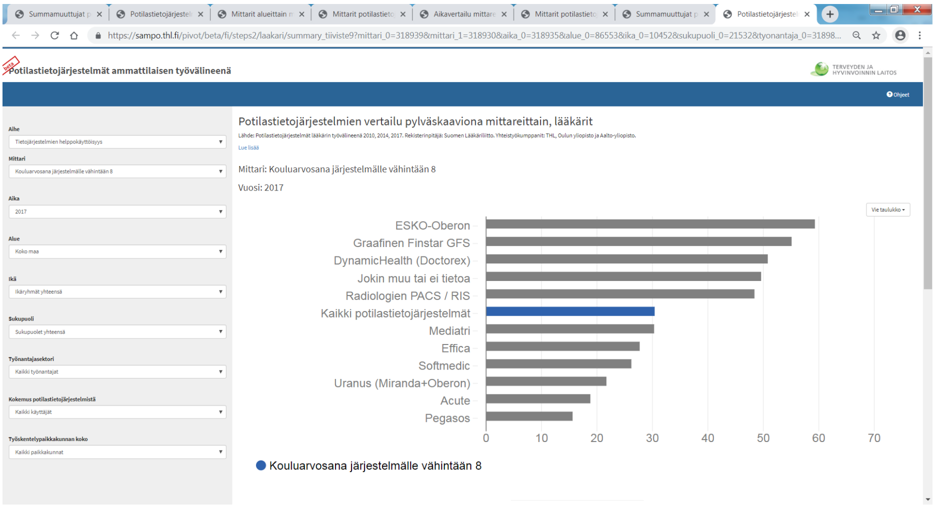
Vuosi: 2017

Kuvaus

Summamuuttujissa on laskettu osuus kysymyksiin vastanneista, joilla summamuuttujan keskiarvo on pienempi kuin 2,5 (hyvä). Summamuuttujat on rakennettu useista väittämistä (2-7). Negatiiviset väittämät on käännetty positiiviseksi laskentaa varten. Mittaria ei ole laskettu, jos vastaajien lukumäärä (n) on pienempi kuin 30.

Figure 7.5. Composite variables of usability by EHR-system on a radar map. Figure shows results of all responders in 2017, the user can select the system (Potilastietojärjestelmä) and time (Aika) from the menus on the left.

In addition to the scale, the professionals were asked to give a school grade to their main EHR-system (scale 4 poor – 10 excellent), and an indicator was formed of respondents scoring their system at least 8. Figure 7.6 shows results by vendor system, in comparison to the average score for all systems (Database only in Finnish, translation in progress). In this view, the user can select the measure of interest, and filter results by time, region, respondents' age, gender, employment sector, respondents' competence in use, and size of region where respondent is working.



Potilastietojärjestelmät ammattilaisen työvälineenä

Aihe
Tietojärjestelmien helppokäyttöisyys

Mittari
Kouluarvosana järjestelmälle vähintään 8

Aika
2017

Alue
Koko maa

Ikä
Ikäryhmät yhteensä

Sukupuoli
Sukupuolet yhteensä

Työnantajasektori
Kaikki työnantajat

Kokemus potilastietojärjestelmistä
Kaikki käyttäjät

Työskentelypaikkakunnan koko
Kaikki paikkakunnat

Potilastietojärjestelmien vertailu pylväskaaviona mittareittain, lääkärit

Lähde: Potilastietojärjestelmät lääkärin työvälineenä 2010, 2014, 2017. Rekisterinpitäjä: Suomen Lääkäriliitto. Yhteistyökumppanit: THL, Oulun yliopisto ja Aalto-yliopisto.

Lue lisää

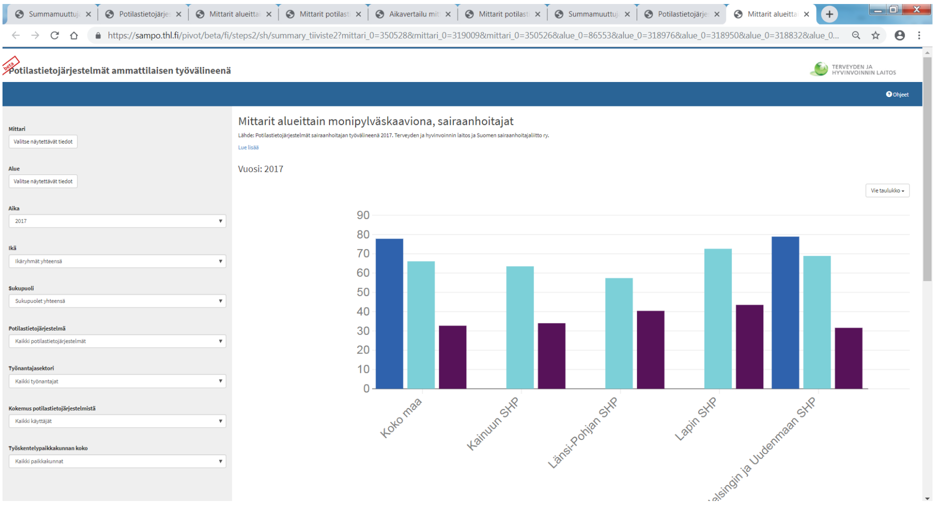
Mittari: Kouluarvosana järjestelmälle vähintään 8

Vuosi: 2017

Figure 7.6. EHR-specific variation in scoring at least 8 (scale 4–10) by physicians. Darker (blue) column represents all responses (all EHR-systems).

Physician and nurse surveys queried about involvement in the development of information systems. Using the comparative view, the database shows, for which EHR-systems professionals have participated more than average, and for which less than average (Chapters 4.6 and 5.7). For more reported results regarding for example health information exchange and user experiences can be found (in Finnish) from Hyppönen, et al. (2018b), Hyppönen, et al, (2018c) and Hyppönen et al. (2018d) (abstract in English).

Organisational surveys queried about in-house training in new functionalities or applications, as well as in digital work processes (Chapters 2.5.1-2 and 3.3.3). Databased results are still under constructions. Professional surveys queried about respondents' digital skills. A composite variable was constructed of different IT-skill areas in the nurses' survey. Viewing it by region shows that although nurses regard themselves as relatively competent IT-users, they feel they do not get adequate training in IT-based operating models or work processes (Figure 7.7).



Potilastietojärjestelmät ammattilaisen työvälineenä

Mittari: Valitse näytettävät tiedot

Alue: Valitse näytettävät tiedot

Aika: 2017

Ikä: Ikäryhmät yhteensä

Sukupuoli: Sukupuolet yhteensä

Potilastietojärjestelmä: Kaikki potilastietojärjestelmät

Työnantajasektori: Kaikki työnantajat

Kokemus potilastietojärjestelmistä: Kaikki käyttäjät

Työskentelypaikkakunnan koko: Kaikki paikkakunnat

Mittarit alueittain monipylväskaaviona, sairaanhoitajat

Lähde: Potilastietojärjestelmät sairaanhoitajan työvälineenä 2017. Terveyden ja hyvinvoinnin laitos ja Suomen sairaanhoitajaliitto ry.

Vuosi: 2017

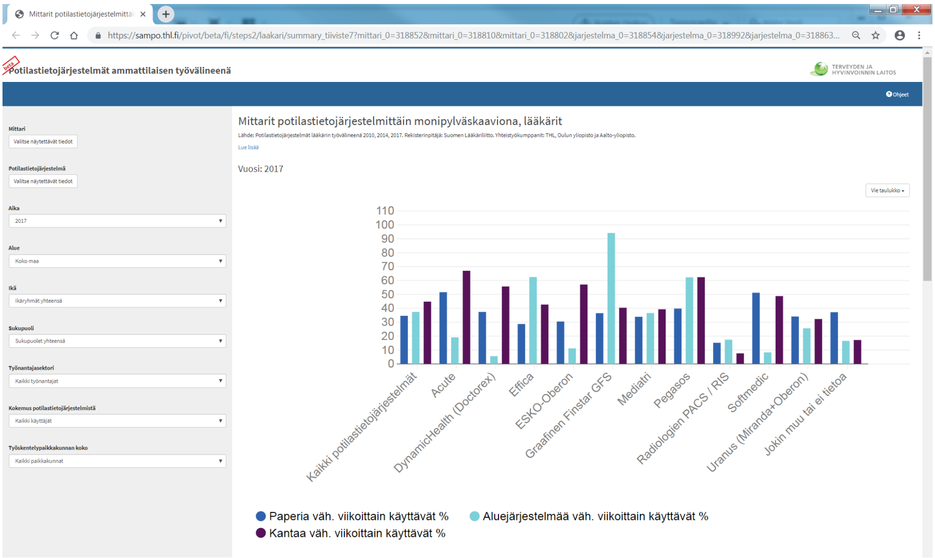
Figure 7.7. Self-assessed competence in IT skills rated by nurses comparing the whole country with different regions in three claims: proportion of competent IT users of professionals (Summa osaavia), proportion of those rating themselves as proficient users (Kokeneeksi) and proportion of those assessing that get sufficient orientation to ICT working methods (Riittävä perehdytys).

7.3 Service System – Effective utilisation of limited resources

The objectives under this target area are:

- to promote the continuity of patient care and patient safety by ensuring the accessibility to up-to-date examination data and patient records in all healthcare situations;
- to improve the effectiveness and impact of service system by re-devision of duties, by reducing the need for treatment and by eliminating the need for overlapping examinations in different locations;
- to improve the availability and accessibility of services via electronic solutions

Availability surveys measured status of health information exchange systems in Finland (Chapters 2.3 and 3.3). The professional surveys measured their use, querying about frequency of use of paper, regional information system and Kanta in health information exchange. The databased results can be viewed e.g. by patient information system (Figure 7.8, in Finnish).



Potilastietojärjestelmät ammattilaisen työvälineenä

Mittari: Valitse näytettävät tiedot
Potilastietojärjestelmä: Valitse näytettävät tiedot
Aika: 2017
Alue: Koko maa
Ikä: Ikäryhmät yhteensä
Sukupuoli: Sukupuolet yhteensä
Työnantajasektori: Kaikki työnantajat
Kokemus potilastietojärjestelmistä: Kaikki käyttäjät
Työskentelypaikkakunnan koko: Kaikki paikkakunnat

Mittarit potilastietojärjestelmittäin monipylväskaaviona, lääkärit

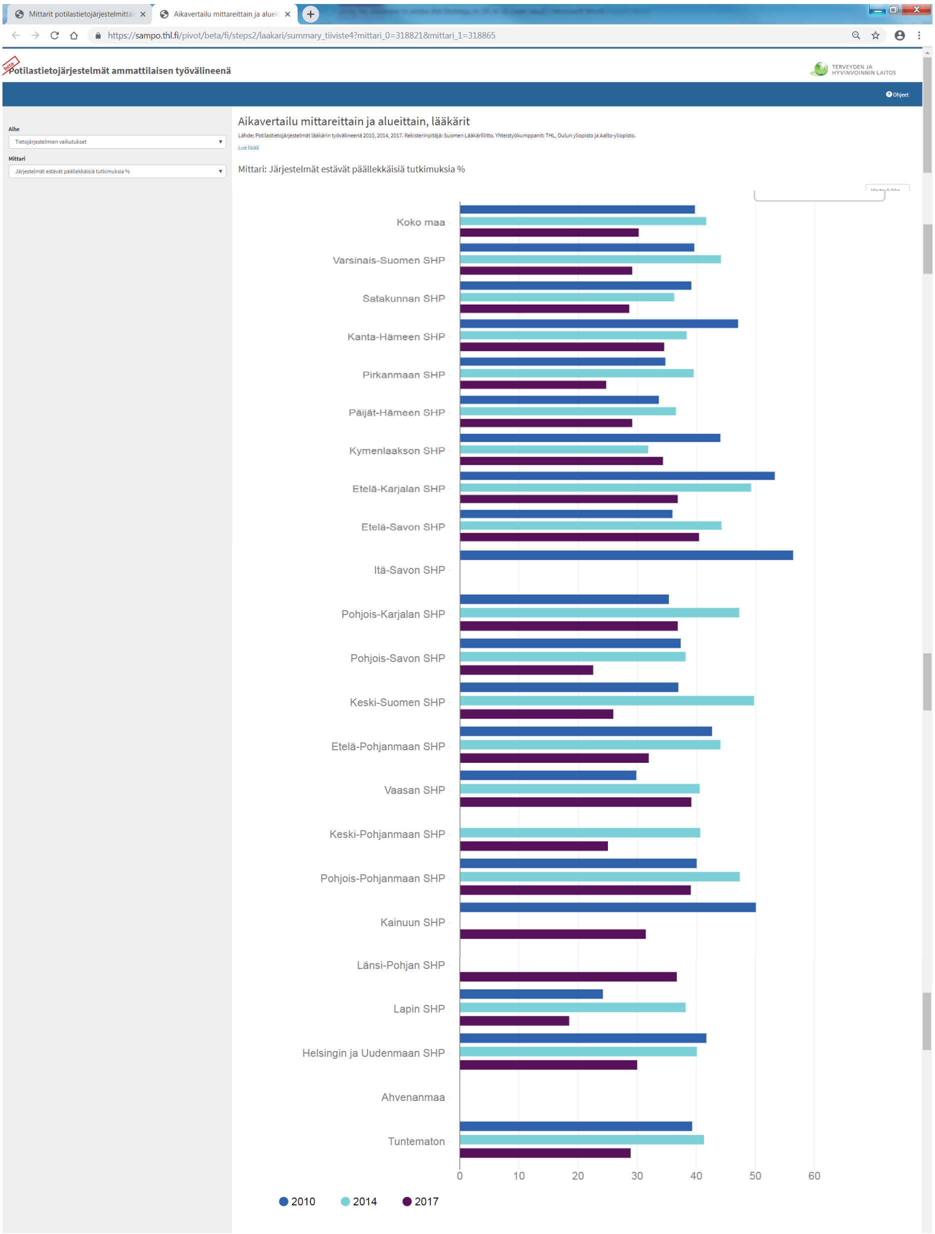
Lähde: Potilastietojärjestelmät lääkärin työvälineenä 2010, 2014, 2017. Rekisterinpitäjä: Suomen Lääkäriliitto. Yhteistyökumppanit: THL, Oulun yliopisto ja Aalto-yliopisto.

Vuosi: 2017

Figure 7.8. Proportion of physicians using paper (Paperi), regional information system (Aluejärjestelmä) and Kanta at least weekly for cross-organisational information exchange.

Continuity of care was measured also by a composite variable “Tietojärjestelmät tukevat tiedonvaihtoa”, depicted on the radar map.

The physicians’ and nurses’ surveys contained several variables measuring benefits of health information exchange systems. Reduction of overlapping examinations is one specific strategic benefit, for which there was a specific measure. It is viewed in figure 7.9 from the database by time and region. Although the Kanta system had been implemented in the public sector by the time of data collection, the functionalities did not yet contain all examination types, which may reflect physicians’ answers (unmet expectations).



Potilastietojärjestelmät ammattilaisen työvälineenä

Aihe: Tietojärjestelmien vaikutukset

Mittari: Järjestelmät estävät päällekkäisiä tutkimuksia %

Aikavertailu mittareittain ja alueittain, lääkärit

Lähde: Potilastietojärjestelmät lääkärin työvälineenä 2010, 2014, 2017. Rekisterinpitäjä: Suomen Lääkäriliitto. Yhteistyökumppanit: THL, Oulun yliopisto ja Aalto-yliopisto.

Lue lisää

Mittari: Järjestelmät estävät päällekkäisiä tutkimuksia %

Figure 7.9. Proportion of physicians by hospital district agreeing that systems help to prevent overlapping examinations.

One composite variable in professional surveys monitors benefits of information systems ("tietojärjestelmät parantavat työn laatua"), depicted in the radar map above. Organisational surveys monitor extensively availability of e-services, and citizen survey monitors their use. The citizen survey also estimates saved visits, depicted on a radar map in chapter 7.1.

7.4 Knowledge-based management

The strategic objectives for this target area are:

- Data sets support the management of service production and decision-making in society in real time
- Data sets support research, innovation and industrial and commercial activities

Results of organisational survey on availability of Management and Data safeguarding systems in healthcare is reported extensively in chapters 2.6. and 3.5. Physicians views on Health Information system support for management are reported in chapter 4.7. In the database, there is a table view showing all measures by EHR-system, with multiple filtering options (Figure 7.10).

https://sampo.thl.fi/pivot/beta/fi/steps2/laakari/summary_tiiviste7?mittari_0=318961&mittari_0=318838&mittari_0=318826&mittari_0=318803&mittari_0=318827&mittari_0=318917&mittari_0=3...

Potilastietojärjestelmät ammattilaisen työvälineenä

Mittari: Valitse näytettävät tiedot

Potilastietojärjestelmä: Valitse näytettävät tiedot

Aika: 2017

Alue: Koko maa

Ikä: Ikäryhmät yhteensä

Sukupuoli: Sukupuolet yhteensä

Työnantajasektori: Kaikki työnantajat

Kokemus potilastietojärjestelmistä: Kaikki käyttäjät

Työskentelypaikkakunnan koko: Kaikki paikkakunnat

Mittarit potilastietojärjestelmittäin monipylväskaaviona, lääkärit

Lähde: Potilastietojärjestelmät lääkärin työvälineenä 2010, 2014, 2017. Rekisterinpitäjä: Suomen Lääkäriliitto. Yhteistyökumppanit: THL, Oulun yliopisto ja Aalto-yliopisto.

Vuosi: 2017

Figure 7.10. Ten management information measures from the physician survey on the database bar chart view with year 2017 and all EHR-systems selected.

7.5 Steering and cooperation in information management – From soloists to harmony

The strategic objective for this target area is that the structures for steering and co-operation in the area of information management are clear and support the social welfare and healthcare service reform. There are no specific measures for this target area in the surveys.

The strategic level steering of the national e-health and e-welfare infrastructure, including the Kanta services, falls under the responsibility of the Ministry of Social Affairs and Health. The Ministry is supported by the Advisory Board for Electronic Information Management in Social and Health Care. The responsibilities of the national institutions are defined by law. Operational steering and co-ordination has been the responsibility of the National Institute for Health and Welfare (THL) since 2011. The task of THL includes planning, guidance, steering and follow-up of the development of the Finnish e-health system. The coordinating function at THL has close working relationships and cooperation with several national actors as well as health and social care service providers, pharmacies and system suppliers. The coordinating function works closely with Kela Kanta services – that run the integrated services – in development teams, groups and steering boards for operative decision making to construct infrastructure, develop services and carry out joint efforts to support citizens, service subscribers and system suppliers (Jormanainen, 2018). There are also many other important stakeholders, such as the The Ministry of Finance and The Association of Regional and Local Governments. The steering system and the overall cooperation have stabilised during the years of the national e-health and e-welfare implementation. However, the steering and the cooperation between the national and the regional and local e-health players still have many open questions. There suggested health and social care system reform included plans to strengthen the cooperation. After the failure of the reform, the possible ways forward have been left to governments to come.

7.6 Infostructure – Ensuring a solid foundation

Strategic objectives for this target area are:

- The architecture is interoperable and modular
- Information security i.e. the accessibility, integrity and protection of data are ensured
- Sufficient data connections will be ensured
- Cooperation in development and procurement

These goals are mainly measured by the organisational surveys, although there are questions about information security and sufficient connections also in the citizen survey. The results have been reported in chapters 2.6.2–2.6.5 for the healthcare sector, and in chapters 3.4–3.6 in the social care sector.

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8 Conclusions and future prospects

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This chapter is reported according to the structure of the Check Point report. Main findings of each chapter are presented first. Further, two points are raised regarding each chapter by answering the following questions 'Where has Finland succeeded?' and 'In which issues we need more efforts and investment in Finland?'.

8.1 Main findings in the availability and use of e-health in Finland

The use of various means of health information exchange has increased compared to earlier time points. Especially regionally, information flow between primary and secondary care is more fluent than before. The electronic referral systems between primary healthcare and specialized medical care are used in all hospital districts and various regional health information systems are used regularly by the primary healthcare centres, especially in medical imaging and laboratory services. The infrastructure now enables also the use of the national health information exchange, The Kanta services.

The volume of e-health services intended for citizens has increased. In addition to direct electronic appointment bookings, different advisory services and services related to viewing your own test results and saving your own data have also become more widespread. Also information on healthcare service provider service quality is more available for citizens.

The increased use of common code sets and classifications lays a good foundation for joining national information systems. All sectors (secondary care, primary healthcare and private sector) have increased their use code sets and common data exchange standards. Also in clinical data elements like electrocardiograms (ECG) the use of standard data formats has increased. This supports the use of national health information exchange services and enables restructuring healthcare delivery.

Where has Finland succeeded?

Finnish healthcare is already extensively digitalized. For professionals, electronic patient records have been deployed extensively across Finland and the infrastructure for connectivity is regionally and nationally advanced. The information is now available at the point of care. The patient data are also more available by mobile applications. For citizens, the infrastructure supports their own access to health data and gradually also storage of their own health data. Support for self-care is progressing.

Clinical decision support (CDS) systems are available more frequently and they are more integrated to electronic patient records than before. The progress has been more prominent in hospitals than in primary healthcare. The most often integrated CDS tools are drug interactions warning systems.

Parallel to the progress in national health infrastructure, also the private sector service providers are following current trends in digitalization. The national standardization of healthcare information structures has given the private sector equal possibilities to share patient information. As a citizen, personal health information is now available at the point of care. Solid backbone of information services promotes new service innovations.

In which issues we need more efforts and investment in Finland?

Intelligent use of existing data for management and research & development & innovation needs improvement. The availability of systems supporting of management on daily basis is low especially in primary healthcare and there is still place for improved integration even in specialized care organisations. The availability of systems supporting research & development & innovation is low in all sectors.

There is still need for improvement in procedures supporting data security. For example, at the hospital district level, there is still lack of a Business Continuity Plan (BCP) and a Disaster Recovery Plan (DRP) among many service providers.

There is a clear need to continue the systematic research activities in monitoring the further digitalization of health care. This is needed for evaluating the consequences of policy decisions and for benchmarking the impact of the investments to healthcare ICT. Because ICT has now a strategic role in the design of new evidence based precision medicine tools and applications, the influences of the novel healthcare services for citizens require indicators for follow-up. Digitalization has been given an important role in reforming the health and social care system. There are expectations that digitalization will improve the cost effectiveness and quality of care and enhance patient involvement. It is important to monitor and evaluate the developments against the expectations.

8.2 Main findings in the availability and use of e-welfare

Social service operators in both the public and the private sector still have work to do to achieve the strategic objectives. Especially the open answers of the private sector highlighted the characteristic features of different organisations: small size, uncertain continuity of operations, questions related to the sufficiency of financial resources, and the fact that the organisation did not have an electronic client information system (CIS). From the viewpoint of the national client data repository that is currently under work, this observation is significant.

The respondents' answers show one positive feature, namely willingness to co-operate between the public and private sectors. Compared to the previous surveys, there are no substantial changes in the overall image of information management in social services. Two thirds of all the development needs related to information exchange that were reported by private sector operators were associated with content-related and technical information exchanges between private and public social welfare service organisations; consequently, the information systems should be modified quickly to support collaboration.

Where has Finland succeeded?

Supply of electronic communications and services that are available to citizens and clients, particularly in the public sector have increased. Moreover, the use of national document specifications especially in child welfare services, despite the fact that the national client data repository is only under construction, indicates that the importance of collaboration between information systems is understood better than before.

In which issues we need more efforts and investment in Finland?

Different expert services that can be integrated into client information systems have already been available since the early 21st century, however these services are used only marginally in both the public and the private sector. Expert services have aimed to solve challenges of electronic information distribution, support for customer services and knowledge-based management.

There is a need for information management in social services. On the national level there have been attempts to solve this with the national reform that will be postponed to the next government's term of office. Service providers find it difficult to assess the need for renewing their information systems, as the full implementation of the social services' client data repository is still in the distant future. The service task classification will form the core structure of client data classification used in the client data archive. Therefore, ensuring that organisations are informed and they have the opportunity to assess the usability of their current systems from the viewpoint of the new document specifications and the resulting documentation requirements.

At the moment, professionals do not have sufficient tools for information management. Information management in social services should be allocated with significantly more national resources than currently. In the Strategy, social services are only viewed as a public administrative structure. The special characteristics of social services, namely the substantial size differences between public and private organisations, the large number of small enterprises in the private sector, and the diversity of the service selection and the resulting amount of resources required to develop information management, are not visible in the steering of the strategic measures. The Strategy focuses on the services available to citizens, but we must question how these services are implemented if the professionals do not have sufficient tools for information management. As more systematic national efforts have been made only in the 21st century to develop information management in social services (Kuusisto-Niemi 2016), the objectives described in the Strategy and the necessary measures require significantly more long-term investments than what is laid out in the Strategy that runs until 2020. Consequently, the specific development needs of information management in social services must be given particular attention in the next stages of the strategy work.

8.3 Main findings in the physicians' experiences of health information systems

Physicians working in the private sector are more satisfied with their current EPR systems with regards to ease of use and technical quality of the systems compared to their colleagues in public hospitals and healthcare centres. The results indicated slight improvements in public hospitals between the years 2010 and 2017: this is shown both in the school grades given to physicians' principal EPR system as well as responses to individual statements. In contrast, results show change to the worse particularly in the public healthcare centres but also in the private sector. What is particularly concerning is the EPR systems' ability to support the physicians in their daily routine tasks: only about one fourth of physicians in public healthcare centres, one third in public hospitals and half in private sector agreed with the statement 'Routine tasks can be performed in a straight forward manner without the need for extra steps using the systems'.

Reduction in paper use for HIE from 2010 to 2017 is quite big. Paper was still in 2017 used for HIE at least weekly by one third of physicians working in the public sector and 40% of physicians in the private sector.

National health information systems implementation coincides with evolvement of easiness of obtaining prescription data from other organisations, but obtaining patient data from other organisations is experienced at as time consuming in 2017 as it was in 2010.

Increase in positive experiences of IT benefits has been very modest. Proportion of those agreeing with different benefits is also still very low, apart from IT supporting care continuity, where over 50% of physicians working in public healthcare centres agreed and IT helping reduce medication errors, where nearly 50% of public healthcare centre physicians agreed.

HIS for management are available in most public hospitals but fewer healthcare centres. However, even in hospitals, they do not yet fulfill the needs of physicians working in managerial positions. Despite this, these systems are used rather actively when available.

Better usability of the EHR systems could help in improving the quality of data documented by health professionals and adherence to commonly agreed guidelines.

Where has Finland succeeded?

Implementation of national Kanta and e-prescription services has been very systematic. Kanta use has increased rapidly, and first benefits are already visible.

Implementation of commonly agreed information structures is a requirement for joining Kanta. This does not yet show improved quality of data, but is likely to show in the near future when the Kanta-archive becomes more established. Data contents available via Kanta need to be (and also is being) increased to improve benefits from HIE.

Usability of EPR's via which HIE systems are used as well as the HIE interfaces need to be improved to enhance electronic HIE and benefits.

In which issues we need more efforts and investment in Finland?

PHR implementation is expected boost patient participation in care and patient-provider communication. Extending Kanta to social care client data has big potential for further enhancing care continuity and productivity (reducing need to document same data in different systems).

In solution associated with management by information, the essential feature is combining operational, financial and personnel data. As a result, simultaneous answers are received – and can be used to support management – to questions such as ’what was done?’, ’who did it?’ and ’how much did it cost?’. It requires a lot of work to achieve such an up-to-date and solid infostructure.

8.4 Main findings in the nurses' experiences of health and social care information systems

Nurses are proficient users with a variety of electronic information systems when coordinating care processes. Information flow, however, is not following nurses' work processes.

Nurses working in social services assessed the usability of the systems more positively compared to nurses in other sectors. For instance 55% of nurses in social sector agreed that nursing data is easily available and are logically presented in nursing records, where 45% of nurses in public hospitals agreed. Also, 55% of nurses in social sector agreed that use of classification in documentation facilitates using data in care planning, where nurses in the public sector only 26% agreed.

Only a minority of the nurses agreed that information systems support the nurse-patient relationship.

In what different areas have we succeeded in Finland concerning nurses' HIS use?

In Finland, nurses have been using HISs since first introducing computers in healthcare in 1970s. Nursing informatics can be studied in bachelor degree programs (University of Applied Sciences), and master and doctoral degree programs (University of Sciences). A model for structured nursing documentation with nursing terminologies has been developed during the last 20 years and made publicly available for implementation in practice.

What are the issues we need more efforts and investment?

Nurses need to be involved in the development work of HISs at the national level.

Lack of interoperability of HISs creates risks for patient safety, loss of resources and frustration in practice. New positions for nurse informaticians and nurse analysts should be established in healthcare and social care to benefit the re-use of data. Nurses' competencies of patient-related digital services need to be strengthened. HIT must be developed so that documenting the same patient data in several times and places can be avoided.

8.5 Main findings in the citizen experiences on e-services

Majority of the respondents could use electronic services independently; still there is a proportion of people who are unable to use electronic services. Barriers for use of electronic services were identified and monitored but more information is needed in order to recognize those in danger of digital exclusion.

More than half had used at least one of the listed social and healthcare services electronically during past year. Competence was a significant predictor of e-service use, age, however was not. Those who had experienced problems in service integration used Internet more in e.g. searching health related information and dealing with health and social services.

Where has Finland succeeded?

Finland has succeeded in implementation of national e-services for citizens in a way that they form the most used e-service functionalities in health care. Citizens also list as the most needed e-services those, for which there are already national functionalities (e.g. viewing laboratory results, prescriptions and detailed clinical notes). A national PHR is being implemented, which will support online documentation and sharing of own measurement data. That was the functionality respondents estimated having saved the most traditional contacts.

Electronic booking and service selection functionalities were regarded as the most useful online functionalities. Developing especially online support for comparing service providers is essential for improving patient's position. E-services supporting self-care and communication and virtual visits are not used as much as anticipated in the Strategy, so at least the national PHR should be implemented rapidly.

What are the issues we need more efforts and investment?

Quality of the e-services needs to be improved, to make them meet the needs of the citizens better. In addition, support for citizens in finding and learning to use the implemented services is crucial, as well as general competence-building to improve citizens' trust in social and healthcare e-services.

8.6 Summary of the main findings and future needs for research

The continuous monitoring of the information and communication technology in Finnish healthcare and social care system has revealed many important aspects of nationwide digitalization of health and social services. As Finland is practically one living lab for this development, these results will help to understand various effects of digital services. The main lessons learned discussed in previous chapters briefly summarized in figure 8.1 below.

Availability and use of e-health	Availability and use of e-welfare	Physicians' experiences of health information systems	Nurses' experiences of health and social care information systems	Citizen experiences on e-services
The use of various means of health information exchange has increased compared to earlier time points.	Social service operators in both the public and the private sector still have work to do to achieve the strategic objectives.	Physicians working in the private sector are more satisfied with their current EPR systems with regards to ease of use compared to their colleagues in public hospitals and health centres.	Only a minority of the nurses agreed that information systems support the nurse-patient relationship.	Majority of the respondents could use electronic services independently, still there is a proportion of people who are unable to use electronic services.
The volume of e-health services intended for citizens has increased.	The respondents' answers show one positive feature, namely willingness to co-operate between the public and private sectors.	National health information systems implementation coincides with evolvement of easiness of obtaining prescription data from other organisations.	Nurses are proficient users but need more guidance to change work practices when implementing HITs and of how to support patients in digital environments.	Competence was a significant predictor of e-service use, age, however was not.
The increased use of common code sets and classifications lays a good foundation for joining national information systems.	Supply of electronic communications and services that are available to citizens and clients, particularly in the public sector have increased.	Reduction in paper use for HIE was big, but some use of paper still exists.	Lack of interoperability between information systems causes a lot of extra work for nurses daily.	Those who had experienced problems in service integration used Internet more in e.g. searching health related information and dealing with health and social services.

Figure 8.1 .Summarized main findings of the Check Point 2018 report.

These sub studies organized in STePS consortium will show how the availability and use of e-services has followed the goals set in national strategies for healthcare and social care. Equally important is to report the user experiences of professionals and citizens. The results are extremely valuable to the policy makers in monitoring the results of investments and decisions. One valuable aspect is that information about availability and use is collected comprehensively from service providers.

The composition of research entity needs continuous refinement. As user experiences of social care workers was not yet included to present studies, it needs to be include to the next generation of this study program.

This systematic monitoring with high scientific quality is unique among countries. Finland has now a remarkable asset in having done this systematic work already 15 years in terms of availability and use and 10 years with evaluation of user experience.

The value of the results is even increasing when more comprehensive aspects are included to the research topics. This information collection will be continued on a permanent basis, enabling more precise planning of future healthcare reforms.

Appendix table 1. Use of internet in issues related to health and welfare according to background factors. Odds Ratios (OR) and 95% confidence intervals (CI) in the fully adjusted models.

	Searching information		Participating in virtual groups		Dealing with services		Comparing service units/ providers	
Effect	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Gender: Male (vs. female)	0.56	(0.46–0.67)	0.80	(0.70–0.90)	0.60	(0.51–0.70)	0.97	(0.86–1–10)
Age <55 yr (vs. 74+ yr.)	5.99	(4.29–8.36)	2.15	(1.72–2.70)	4.79	(3.46–6.63)	2.11	(1.69–2.64)
Age 55–74 yr. (vs. 74+ yr.)	1.84	(1.53–2.21)	1.54	(1.33–1.79)	2.44	(2.03–2.93)	1.61	1.39–1.87)
Employment: Other (vs. working)	1.38	(0.88–2.18)	0.88	(0.76–1.02)	0.91	(0.66–1.25)	1.01	(0.83–1.23)
Retired (vs. working)	0.72	(0.55–0.94)	1.01	(0.86–1.18)	0.74	(0.56–0.98)	1.03	(0.86–1.24)
Unemployed (vs. working)	0.83	(0.48–1.43)	1.02	(0.77–1.35)	0.95	(0.67–1.34)	0.93	(0.70–1.23)
Education High (vs. low)	1.56	(1.24–1.96)	0.86	(0.74–1.01)	1.59	(1.30–1.95)	0.82	(0.71–0.96)
Education: Intermediate (vs. low)	1.33	(1.06–1.69)	1.00	(0.85–1.17)	1.34	(1.09–1.63)	1.02	(0.87–1.19)
Chronic illness (yes vs. no)	1.14	(0.95–1.37)	1.39	(1.21–1.59)	1.62	(1.38–1.92)	1.18	(1.03–1.34)
Financial hardship (yes vs. no)	1.36	(1.04–1.78)	1.33	(1.13–1.58)	1.09	(0.86–1.39)	1.29	(1.10–1.52)
Use of social services (yes vs. no)	0.84	(0.56–1.27)	1.31	(1.01–1.70)	1.22	(0.87–1.70)	0.89	(0.69–1.14)
Use of health services (yes vs. no)	2.06	(1.62–2.63)	1.32	(1.11–1.55)	2.06	(1.68–2.51)	1.12	(0.95–1.33)
Semi-urban (vs. urban area)	1.08	(0.86–1.35)	0.98	(0.83–1.14)	0.77	(0.63–0.95)	0.88	(0.75–1.03)
Rural (vs. urban area)	0.83	(0.66–1.04)	0.93	(0.81–1.06)	0.72	(0.61–0.86)	0.81	(0.71–0.92)

Appendix table 2. Perceived usefulness of of internet use in issues related to health and welfare according to background factors. Odds Ratios (OR) and 95% confidence intervals (CI) in the fully adjusted models.

	Searching information		Virtual participation		Dealing with services		Comparing service units/ providers	
Effect	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Gender: Male (vs. female)	0.73	(0.63–0.83)	0.57	(0.47–0.69)	0.67	(0.58–0.77)	0.69	(0.57–0.83)
Age <55 yr (vs. 74+ yr.)	1.48	(1.16–1.88)	3.66	(2.50–5.34)	1.56	(1.20–2.03)	1.15	(0.82–1.62)
Age 55–74 yr. (vs. 74+ yr.)	1.09	(0.92–1.29)	1.79	(1.34–2.40)	1.69	(1.42–2.03)	1.30	(1.01–1.66)
Employment: Other (vs. working)	0.85	(0.70–1.05)	1.14	(0.86–1.52)	0.94	(0.76–1.17)	1.06	(0.81–1.40)
Retired (vs. working)	0.87	(0.71–1.06)	1.13	(0.85–1.52)	1.11	(0.90–1.37)	0.88	(0.67–1–15)
Unemployed (vs. working)	1.10	(0.83–1.46)	1.03	(0.69–1.56)	1.16	(0.86–1.57)	1.04	(0.70–1.57)
Education High (vs. low)	1.32	(1.13–1.56)	1.20	(0.96–1.51)	1.23	(1.04–1.46)	1.16	(0.93–1.4)
Education: Intermediate (vs. low)	1.20	(1.01–1.41)	0.95	(0.76–1.19)	1.19	(1.00–1.42)	0.87	(0.70–1.08)
Chronic illness (yes vs. no)	1.01	(0.88–1.17)	0.90	(0.74–1.09)	1.04	(0.89–1.21)	0.90	(0.74–1.09)
Financial hardship (yes vs. no)	1.08	(0.91–1.28)	0.80	(0.64–1.00)	0.81	(0.68–0.96)	1.07	(0.85–1.35)
Use of social services (yes vs. no)	1.29	(1.00–1.67)	1.11	(0.82–1.51)	1.16	(0.89–1.53)	1.11	(0.78–1.57)
Use of health services (yes vs. no)	1.15	(0.96–1.38)	1.02	(0.79–1.31)	1.23	(1.01–1.50)	0.96	(0.75–1.23)
Semi-urban (vs. urban area)	0.89	(0.75–1.05)	0.91	(0.72–1.16)	0.85	(0.71–1.01)	0.85	(0.67–1.09)
Rural (vs. urban area)	0.90	(0.78–1.03)	0.89	(0.73–1.09)	0.85	(0.74–0.99)	0.80	(0.66–0.98)

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