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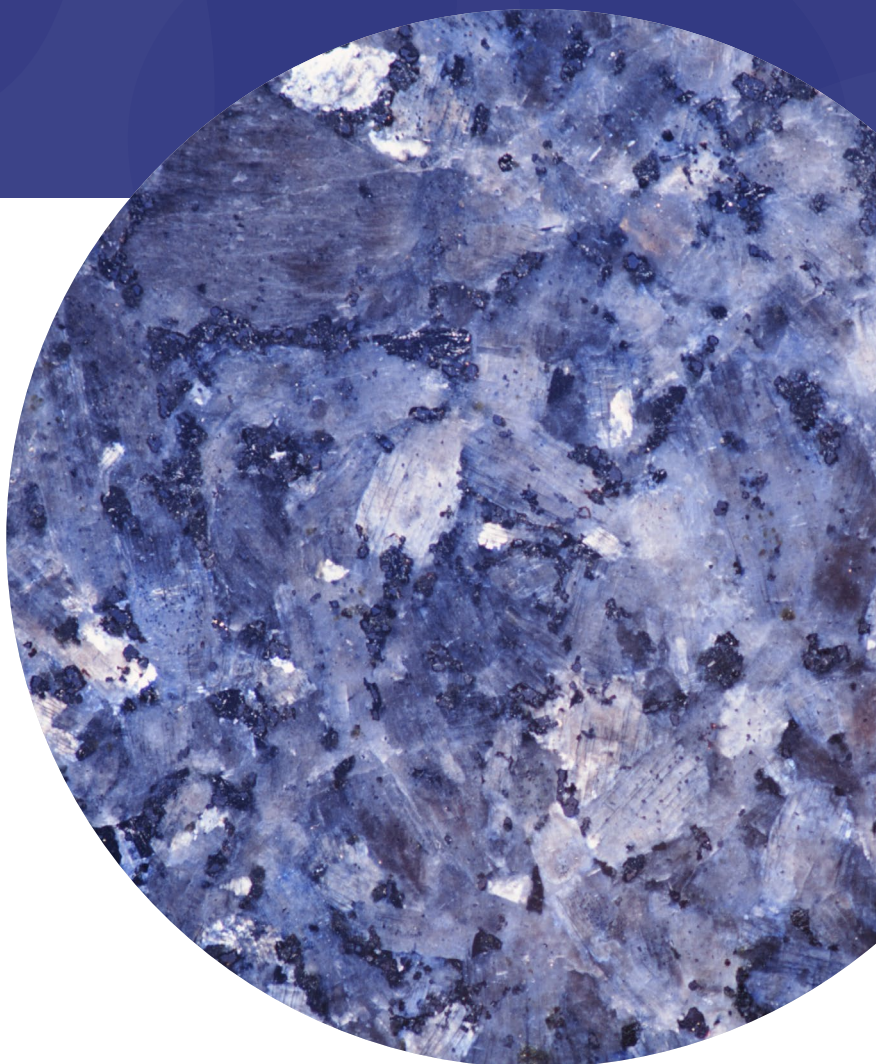
E-health and e-welfare of Finland

Check Point 2022

Tuulikki Vehko (ed.)

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Finnish institute for
health and welfare

Foreword

E-health and e-welfare of Finland − Check Point Finland 2022 report brings together the results of 2020 on the progress of digitalisation of social and health care in Finland. The report is based on the research of the STePS 3.0 project, 'Monitoring and assessment of social welfare and health care information system services', coordinated by the Finnish Institute for Health and Welfare (THL). The report presents the results of the research from the perspectives of citizens, physicians, registered nurses, and social welfare professionals as well as social welfare and healthcare organi-zations alike. The research has been conducted in cooperation with THL, the University of Oulu, University of Lapland, University of Eastern Finland (UEF), the Finnish Medical Association (FMA) and Kela. In addition, collaborators have included Aalto University, the Finnish Nurses Association (FNA), the Union of Health and Social Care Professionals (Tehy), Union of Professional Social Workers (Talentia) and the Trade Union for the Public and Welfare Sectors (JHL).

The research carried out in the STePS 3.0 project is part of a long series of data collection, which started in some respects as early as 2003. Previous research was conducted in 2017, after which the Kanta Services have been expanded with the opening of new services such as the Data Repository for Social Services, and data warehouse for citizens' own data related to health applications and wellbeing. The My Kanta Page, national e-prescription and Kanta Services with a patient data repository have been comprehensively and firmly taken into use. Legislation has also evolved since 2017. In 2019, a law on the secondary use of social and healthcare records came into force.

Similarly to previous studies, the research explored the perspectives of citizens, professionals, social welfare organisations and health care organisations. A new section included a survey aimed at social welfare professionals (educated at university or a university of applied sciences). From the citizen perspective, the study examined the availability, use and user experiences of e-health and e-welfare services. From the perspective of social and healthcare professionals, the experienc-es of social welfare and healthcare information systems were explored. The study will provide valuable information on the development of digitalisation since the 2017 research and the situation and impact of implementing the 'Information to support wellbeing and service renewal - eHealth and eSocial Strategy 2020'in 2020–2021.

The research period was before the implementation of the health and social care reform and the launch of the wellbeing service counties. The situational awareness produced by this research pro-vides a picture at the time before a major turning point in health and social service system and will be a major benchmark for research in the years ahead.

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Acknowledges

Head of Communications Piritta Rautavuori (THL). The authors want to thank the research organisations for supporting the work with administrative services. In addition, the authors wish to express our special thanks to several professionals from THL for reading the various chapters of the book and for giving their time to review the text. Warm thanks to the Erja Ailio, Kaisa Hujanen and Salla Ruotsalainen.

The authors also want to thank all the social and health care experts who were involved in the design of the surveys as well as the survey participants for giving their valuable time when answering the questionnaires.

Helsinki, 4.1.2023

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Abstract

The Ministry of Social Affairs and Health of Finland has regularly commissioned national surveys on e-health and e-welfare to monitor state of the art and trends in Finland in order to gain evidence for decision-making and evaluation of strategic goals. The latest data are from spring 2020 to early 2021. The data collections have been built to support the assessment of the strategic goals set by the ministry in 'Strategy for Social and Health Care 2020'. The implementation period for strategy, published in the beginning of 2015, has officially ended. Results from 2010, 2014, 2017 and 2020–2021 have been published as dynamic database reports (www.thl.fi/digikyselyt). The report at hand presents a compilation of the main results and serves international benchmarking. The report is produced by the Finnish Institute for Health and Welfare (THL), FinnTelemedicum Research Unit at the University of Oulu, Aalto University, University of Eastern Finland, University of Lapland and the Finnish Medical Association.

At the time of the data collection the national health information system (HIS) and health information exchange (HIE) services (Kanta Services), that include Prescription Centre (electronic prescriptions), Patient Data Repository (health data) and My Kanta Pages (patient accessible electronic health records), were in common use in healthcare. Furthermore, Kanta Services have launched Data Repository for Social Services (social welfare services), and Kanta Personal Health Records (health and wellbeing applications), which have however not yet been fully introduced to use. The six surveys of the report have been depicted in table A.

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

Survey	Focus	Informants	Years
1) e-Health	e-health implementation, adoption and use	Public primary healthcare and secondary and private healthcare provider organisations	2003, 2005, 2007, 2011, 2014, 2017, 2020
2) e-Welfare	e-welfare implementation, adoption and use	Public and private social welfare service organisations	2001, 2010, 2014, 2017, 2020
3) Physicians' experiences	usability, experienced benefits and challenges	Public and private physicians	2010, 2014, 2017, 2021
4) Registered nurses' experiences	usability, experienced benefits and challenges	Registered nurses working in public and private healthcare and social welfare services	2017, 2020
5) Social welfare professionals' experiences	usability, experienced benefits and challenges	Social welfare professionals' working in public and private social welfare services	2020
6) Citizens' experiences	use, experienced benefits and challenges	Representative sample of adult population	2014, 2017, 2020

The e-Health survey (1) includes data from all the public hospital districts delivering secondary or tertiary care and 96 percent of the public primary healthcare centres (population coverage 99 percent). A sample of twelve private sector service providers is also included (containing those private service providers operating as a chain). The survey focuses to the availability and intensity of use of various healthcare information systems in organisations, maps the services provided to citizens and discusses data safety and training aspects.

The e-Welfare survey (2) focused on availability of information systems, knowledge-based management, information exchange, data management, availability of digital social welfare services for citizens and readiness to join the national Kanta Services. The survey was sent to a total of 1,946 social welfare service provider organisations, and a total of 356 responses were submitted by public, private and third sector organisations. Public social welfare service respondent organisations covered 74 percent of the population.

The survey of physician experiences (3) was addressed to all working age physicians in clinical work in Finland. Totally 4,640 physicians who reported using health care information systems for patient work and/or administrative purposes responded to the survey (estimated response rate 24 percent). The survey focused on usability of EHRs, HIE, physicians' participation in the IT system development, and information system support for management.

The survey of registered nurses' experiences (4) assessed the usability of healthcare and social services information systems and explored the proficiency of use. The received respondents (n=3,610) represented working age registered nurses who were employed in public hospitals, primary health care centres, private sector and social welfare services.

Based on a large pilot study, social welfare professionals' experiences on client information systems were assessed as a part of professionals' end-user experiences (5). The survey was addressed to working age professionals educated at a university or a university of applied sciences. The received respondents (n=990) represent mainly licensed social welfare professionals, the most of whom worked in the public sector.

The survey of citizen experiences (6) was carried out as part of the national survey of health, well-being and service use (FinSote). The population survey (n=60,711) response rate was 46.4 percent, but most of the questions concerning digitalization were delivered in a subpopulation sample (n=12,980) with a response rate of 46.5 percent. The data was corrected with appropriate population weights and covers respondents aged 20–99.

According to the results of the e-Health survey (1), all key patient data are processed exclusively electronically in specialised medical care, public primary healthcare and in the activities of private sector actors in the sample alike. Many forms of data sharing are in active use regionally, contributing to the ongoing health and social services reform. The volume of e-Health services intended for citizens has steadily increased.

According to the e-Welfare survey (2), digital services for citizens were provided by a slightly more social welfare organisations than in 2017. Client information systems were in use in almost all public social welfare organizations, but approximately a quarter of non-public social welfare organizations still operated without one. Only a minority of social welfare organizations reported they have started using Kanta Services. In 2021 an updated legislation clarifies the implementation of national data structures, and is likely to accelerate the wider deployment of harmonized data structures.

According to the physician survey (3) the technical quality of the EHR systems had increased since 2017. There was variation between employment sectors in the assessments related to ease of use. In the private sector, physicians were more satisfied with their EHR systems than their colleagues in public healthcare. Kanta Services

provide an important route for HIE. The usage of paper documents in HIE between various parties has decreased and the use of electronic solutions have increased. In 2021, information systems were not experienced to support inter-organizational collaboration or physician-patient collaboration.

The survey on registered nurses' experiences (4) revealed that under half of the respondents were satisfied with their HISs. The registered nurses' have good competencies to use HIS. In 2020, one third of the nurses reported that they used paper documents when obtaining patient data from other organizations. Obtaining patient data from other organizations was still perceived time consuming. Registered nurses assessed that continuity of care, care quality and patient safety are key areas of advantages that HIS already provide. They expressed doubts about the functionalities of the systems to compile summary views. From registered nurses' point of view, HIS were not experienced to support inter-organizational collaboration or nurse-patient collaboration.

The survey on social welfare professionals' experiences (5) revealed that the technical functionality of the client information systems, and the support for the performance of routine tasks are at a satisfactory level. However, client information systems support for case-based knowledge formation, collaboration, and information exchange are at an unsatisfactory level.

The results of the survey of citizens' experiences (6) showed that majority (85 percent) assessed their digital skills good, but people in older age groups assessed their skills systematically poorer than people in younger age groups. Majority (83 percent) of the citizens used e-services independently, for example My Kanta Pages or MyTax. However, 11 percent of the population did not use these general e-services, and six percent needed help in their use. The digitally excluded part of the population might for example lack an internet connection and the necessary skills in navigating digital environments. Dealing with the barriers of e-service use would be important to prevent unvoluntary digital exclusion. More than a fifth (22 percent) of the population had visited a social welfare or a healthcare professional online during the previous 12 months. The prevalence of online visits varied between regions from 12 to 35 percent. The users of online social welfare or healthcare services were on average content with the quality of the available services (My Kanta Pages, Omaolo, Terveyskylä, local e-services and occupational healthcare services).

The social and healthcare services are already highly digitalized in Finland. During the COVID-19 pandemic, the use of e-services increased. When the use of e-services become more common, it is important to consider data security, in which organizations and their cybersecurity and training practices play an important role. Service renewal as a socio-technological change continues and affects the solutions the social and healthcare organizations use for service provision. From the professionals' perspective, HIE between information systems needs improvements in order to facilitate search of the relevant information. The information on usability of client information

systems pointed out that case-based knowledge formation, collaboration, and information exchange also need improvements. The use of the national Kanta Services for social welfare services as well as for healthcare services and the professionals' experiences related to their use, should further be monitored in the future.

The ongoing health and social services reform changed the financial and organizational basis for public social welfare and healthcare services from 2023. The 21 self-governing counties and the capital Helsinki are in charge of social and healthcare services in continental Finland. Most services deliver still by public providers. This major change is likely open new possibilities to share information between service providers, and improve patient cure and care policies. From citizens' perspective, effort and investments on e-service development, implementation processes and adoption efforts, are needed in order to ensure equal access to e-services. It will be important to monitor the developments in the counties, and if there are able to provide equal services to their inhabitants.

The extended package of surveys has produced monitoring and follow-up information already during several years. The target audience of the information is wide: information system suppliers and decision-makers in the field of evidence-based development of digital work and services. This multithreading research entity is globally unique in its coverage and a solid way of producing new and up-to-date knowledge.

Author Biographies

Sanna Hautala (PhD) is a Professor of Social Work at the University of Lapland. Her research activities have profiled in challenging and sensitive phenomena in social work. Her recent research has focused on the position of the most vulnerable people in a changing operating environment from a multifaceted perspective and as a part of the professionalism and expertise of social work. Her research is united by an effort to make the situations of people living on the margins of society visible and to reflect on the ethical issues of social work. In addition, she has been responsible for the social welfare substudy of the 'Monitoring and assessment of social welfare and health care information system services 3.0' project.

Jari Haverinen (MSc, MHSc.) is Senior Planning Officer in the Finnish Coordinating Center for Health Technology Assessment (FinCCHTA). His main responsibility in FinCCHTA is the Digi-HTA assessment method what enables to perform health technology assessments (HTA) for novel digital healthcare technologies such as mobile apps, artificial intelligence and robotics. He also works as a Doctoral researcher at the FinnTelemedicum research group in Faculty of Medicine of the University of Oulu. His research area is the development of new HTA methods for digital health solutions as well as eHealth research.

Tarja Heponiemi (PhD) is a Research professor from Finnish Institute for Health and Welfare (THL) at the Health and Social Service System Research unit with a special focus on health and social care services research. Her research focus has been on health informatics, healthcare employees' workload, attitudes, work roles and turnover as well as consequences of digitalization to health professionals. Specifically, she is interested in the increased digitalization of services and its effect on clients and professionals. She is currently leading a consortium 'Towards socially inclusive digital society: Transforming service culture' (DigiIN) funded by the Strategic Research Council.

Päivi Hämäläinen (emeritus)
PhD, MD, MA (soc.sci), Specialist of Public Health and General Medicine, has special qualifications in healthcare information technology. She has worked at THL and the Finnish Ministry of Social Affairs and Health. Her research and development focus has been health care systems, eHealth, and information infrastructures. She has participated in numeral national and international working groups and research projects, such as OECD- and EU-work.

Vesa Jormanainen MD, MSc, Specialist in Public Health Medicine. Current position is Senior Ministerial Advisor, Medical Affairs in the Ministry of Social Affairs and Health in Finland at Service System Unit since 2021. Previously he worked in the Finnish Institute for Health and Welfare (THL) as Chief Specialist at Performance Assessment of the Health and Social Service System. In addition, he worked in the THL as Director of Operational Management to make real large-scale implementation and adoption of the national Kanta ICT services for social welfare and healthcare services in Finland in 2010–2017. He also has experience in concept building and directing medical technology assessment at the Finnish Medicines Agency in 2009–2010. He has international working experience from major pharmaceutical companies in health economics, outcomes research and pricing as team manager. Previously he was in Board of Directors at the European Health Telematics Association (EHTEL, Brussels, Belgium). Currently he is the Chairman of the Finnish Association of Public Health Medicine and Board Member at the Finnish Society of Telemedicine and eHealth.

Maarit Kangas (PhD, medical technology) is a coordinator at the University of Oulu. She has been involved in e-health surveys starting from 2005. Her research field has been eHealth services on national and international level.

Ulla-Mari Kinnunen Professor of Health and Human Services Informatics (HHSI), Faculty of Social Sciences and Business Studies, Department of Health and Social Management, University of Eastern Finland. She is a Professor in HHSI Master's programme and an Adjunct Professor in Evidence Based Research and Development. Her research interest is in data structures and classifications in electronic health records, evidence-based health care and informatics competencies both for professionals and citizens including educational and organizational factors in enhancing digitalization in health and social care services. She is a member of the board of the Finnish Social and Health Informatics Association, of the scientific editorial board of the Finnish Journal of eHealth and eWelfare, a chair of the Finnish nursing terminology expert group and a member of the Evidence Based Practice Working Group IMIA SIGNI. She is a core staff member of the Finnish Centre for Evidence-Based Health Care: A Joanna Briggs Institute Centre of Excellence. She has been involved in the project 'Monitoring and assessment of social welfare and health care information system services' 2.0 and 3.0 in the part of nurses' system assessment.

Niina Keränen (MD, MHSc) works as a Doctoral researcher at the FinnTelemedicum research group in Faculty of Medicine of the University of Oulu. She has been involved in Finnish eHealth availability studies since 2014. Her interests include also advanced sensoring technologies, safety and regulations issues in medical technology and participation in the development of the new Digi-HTA assessment method for novel digital healthcare technologies. She has also published about citizen involvement and digital applications for elderly population. She has also developed new teaching methods in digital environment.

Maiju Kyytsönen (MHSc, RN) is a researcher in Finnish Institute for Health and Welfare at the Health and Social Service System Research unit, where she is currently working in the project 'Monitoring and assessment of social welfare and health care information system services 3.0'. Her research mainly focusses on citizens' experiences of social welfare and healthcare e-service use and on professionals' experiences of electronic health record and client information system use. She is particularly interested in the digital transformation of the fields and in information security.

Tinja Lääveri MD, PhD, specialist in Internal Medicine. She has long background in clinical medicine, particularly Internal Medicine and Infectious Diseases in the Helsinki City Hospitals and HUS Helsinki University Hospital. She started working with eHealth in 2008 after becoming the chair of the eHealth Committee of the Finnish Medical Association, a position she held until 2012; she is still a member of the Committee. She started working in the HUS Helsinki University Hospital ICT department in 2010, and in the Apotti project in 2012, where she currently works as specialized healthcare lead. Her employers did not provide any support, financial or otherwise, for these studies. Moreover, they were not involved in the design of the studies or in the collection, analysis, and interpretation of the data.

Tinja Lääveri has published 56 peer-reviewed articles, mainly in the fields of infectious diseases, usability of health and social welfare information systems, and end-user involvement in the development of these systems. She currently holds a post-doctoral position in the Aalto University. She was one of the original designers of the physicians' usability study, and she later participated in the designs of the registered nurses' and social welfare professionals' studies.

Susanna Martikainen (Doctor of Philosophy, Computer Science; Bachelor of Culture and Arts, Graphic Design) is a managing consultant and service designer at NHG Salivirta. Her research field is health informatics focusing on development of social welfare and healthcare information systems. She is particularly interested in user participation in information system development.

Jarmo Reponen (MD, PhD, Radiologist) is working as a Professor at the Research Unit of Health Sciences and Technology at University of Oulu. His main area of research is healthcare information systems, especially eHealth maturity and user experience. Other research areas involve artificial intelligence, innovation activities and new HTA methods. He has been involved for more than 30 years in the development and implementation of healthcare information systems and has served as a president of scientific societies in the field nationally and internationally, chairing many international conferences. He is a founding member of the Finnish Society of Telemedicine and eHealth and one of the founders of the Finnish Journal of eHealth and eWelfare. Reponen has published more than 90 peer-reviewed articles and acts as the vice leader of the DigiHealth research profiling program at the University of Oulu.

Ronja Ruotanen (MHSc) is a Technology Consulting Analyst. In her previous position at the University of Oulu, she was involved in a Finnish e-health survey in 2020. Her Master's thesis focused on the development and availability of e-health services for Finnish citizens in specialized and primary health care and private medical service providers from 2011 to 2020.

Peppiina Saastamoinen (PhD; MSc, public health) works currently as a researcher in the Finnish Medical Association (FMA), where she is involved in a wide range of studies on labour market issues. Prior to her current position, she worked several years at the University of Helsinki, Department of Public Health. Her main area of expertise includes epidemiological studies on work-related health and well-being. Electronic health record systems as tool for physicians -study relates closely to working conditions and thereby to work related well-being. It is one of the many studies FMA carries out in collaboration with external partners. In free time she explores the epidemiology of amyotrophic lateral sclerosis.

Samuel Salovaara is MSocSc and a doctoral candidate at the University of Lapland and has worked in project 'Monitoring and assessment of social welfare and health care information system services 3.0' focusing on social welfare. Salovaara's current research addresses the utilization of the information produced by social welfare information systems and investigates how the information system becomes part of the various knowledge formation processes in social work, such as case-based social work and knowledge-based management. Salovaara has also worked as a social worker in the fields of child welfare and social and crisis emergency services and as a senior application analyst in the information system development project.

Kaija Saranto (PhD, RN, FACMI, FAAN, FIAHSI) is a Professor in Health and Human Services Informatics (HHSI) at University of Eastern Finland. Under her supervision more than 20 doctoral students have graduated. She has been involved both nationally and internationally in the implementation and development of health information technology (HIT) adoption in the service system. She is a chair/member of several international societies and has been chairing international conferences eg. MedInfo. Her research interest is on impacts of eHealth, virtual care, and patient safety. Currently she is the PI for the research project focusing on shared decision making (Proshade) funded by the Strategic Research Council.

Marianne Silén (DSocSc, MSc) is an university lecturer in the University of Lapland. Having a master's degree in statistics and doctoral degree in sociology her area of expertise includes statistics and the use of quantitative research methods in social sciences. She is particularly interested in interdisciplinarity and interdisciplinary studies which involve the use of statistical methods.

Timo Tuovinen (MD) is a university lecturer in University of Oulu and a clinician (obstetrics and gynecology) in Oulu University Hospital. His research interests are quite broad including eHealth, medical leadership, medical education and neuroscience. He is a member of the executive committee in the Association for Medical Education in Finland (AMEF), a former chair of eHealth education division in the National MEDigi project and a former District Chief Physician of The Finnish Medical Association. Most importantly, however, he is the father of a brisk boy and a wood badge scout.

Tuulikki Vehko PhD (health service research). Current position is Research Manager at THL, at the Health and Social Service System Research unit, and she is leading Monitoring and assessment of social welfare and health care information system services (STePS 3.0) -project Her research field is health service research focusing increasingly on evaluation studies. Research methods used cover both quantitative (survey studies and registered based studies) and qualitative (focus group interviews and vignette studies) methods.

Johanna Viitanen (DSc Tech.) is working as a Professor at the Department of Computer Science at Aalto University. Her area of research is human-centred health informatics, with emphasis on usability and user experience research. Viitanen was part of the multidisciplinary team, who designed the original usability-focused questionnaire for physicians in 2009. Since then, she has contributed to design of the survey studies for physicians, nurses and social welfare professionals, as well as to the development of the nation-wide usability-focused survey instrument (NuHiSS). Viitanen has published more than 60 peer-reviewed articles in the fields of health informatics and human-computer interaction (HCI), including 30 papers about the Finnish national usability-focused survey studies.

Katri Ylönen (Licentiate of social sciences) is a doctoral candidate at the University of Jyväskylä. She works as a project manager in 2M-IT, helping public social and health care organizations in various digitization projects. Her current research addresses social workers' experiences about the use of electronic information systems (EIS). She has also worked in a client and patient information system development project in Central Finland and has many years experience as a social worker in the fields of adult social work and child welfare services.

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. Esittelemme raportissa 2020−2021 toteutettujen tiedonkeruiden pohjalta koostusti päätuloksia kansainvälisille tutkijoille ja päättäjille. Raportin tiedonkeruut toteutettiin koronapandemian aikana, jolloin terveydenhuolto ja sosiaalihuolto olivat kovassa kuormituksessa. Ajankohta toi esille vahvasti digitaalisten palveluiden tarpeellisuuden. Toivomme, että sosiaali- ja terveydenhuollon sähköisten palvelujen tilasta kiinnostuneet lukijat myös kotimaassa hyötyvät raportistamme. Tutkimukset ja niistä koostettu raportti toteutettiin yhteistyönä Terveyden ja hyvinvoinnin laitoksen, Oulun yliopiston, Lapin yliopiston, Itä-Suomen yliopiston, Aalto-yliopiston ja Suomen Lääkäriliiton kanssa.

Edellinen tiedonkeruu toteutettiin vuonna 2017, minkä jälkeen on esimerkiksi laajennettu valtakunnallisia tietojärjestelmäpalveluita sosiaalihuollon asiakastiedon arkistoon ja kansalaisten omien hyvinvointitietojen omatietovarantoon. Nyt toteutetun tiedonkeruun aikana Omakanta-palvelu, sähköinen lääkemääräys ja potilastiedon arkisto ovat olleet kattavasti ja vakiintuneesti käytössä. Myös lainsäädäntö on kehittynyt vuoden 2017 jälkeen. Vuonna 2019 tuli voimaan laki sosiaali- ja terveystietojen toissijaisesta käytöstä. Kansallisen ohjauksen näkökulmasta Sote-tieto hyötykäyttöön -strategia 2020 kausi oli tullut päätökseen.

Terveydenhuollon tieto- ja viestintäteknologian käyttöä kartoittava kysely toteutettiin 2020. Vastauksia saatiin kaikista sairaanhoitopiireistä (n=21), suurimmasta osasta perusterveydenhuollon terveyskeskuksia / terveyskeskuksia (n=130) ja otos (n=12) yksityisensektorin palveluntarjoajista. Sosiaalihuollon organisaatiokyselyllä selvitettiin sosiaalihuollon organisaatioiden sähköisten palveluiden, tietojärjestelmäratkaisujen ja tiedonhallinnan tilannetta. Kysely lähetettiin 1 946 sosiaalihuollon organisaatiolle ja siihen saatiin syksyllä 2020 kaikkiaan 356 vastausta julkisilta (n=90) ja yksityisiltä tai kolmannen sektorin organisaatioilta (n=266). Sairaanhoitajille suunnatussa kyselyssä maaliskuussa 2020 kartoitettiin kokemuksia asiakas- ja potilastietojärjestelmien käytöstä, niihin liitetyistä hyödyistä ja arvioita omasta osaamisesta. Vastaajat (n=3 610) edustivat iän suhteen kohderyhmää hyvin. Vastausprosentti jäi kokonaisuudessaan matalaksi (6,2 %). Kyselylinkki tarjottiin sähköpostissa ja niistä, jotka avasivat asiaa koskevan sähköpostin, vastasi 36 prosenttia. Sosiaalialan korkeakoulutettujen kyselyyn syksyllä 2020 vastasi 990 ammattilaista. Kyselyssä kartoitettiin kokemuksia asiakastietojärjestelmien käytöstä ja niihin liitetyistä hyödyistä sekä arvioita tuesta työlle ja johtamiselle. Potilastietojärjestelmät lääkärin työvälineenä -kyselyn otoksena olivat kaikki työikäiset lääkärit Suomessa. Kysely toteutettiin helmikuussa 2021 ja vastausprosentti oli 24,5. Tarkastelu rajattiin potilastietojärjestelmiä työssään käyttäviin lääkäreihin (n=4 640). Kysely keskittyi potilastietojärjestelmien tekniseen toimivuuteen, helppokäyttöisyyteen sekä niiden antamaan tiedolla

johtamisen tukeen. Kansalaisten kokemuksia kartoittava kysely toteutettiin Terveyden ja hyvinvoinnin laitoksen FinSote -väestökyselyn yhteydessä (n=28 199, vastausprosentti 46 %). Tutkimuksen alaotoksena (n=6 034) toteutetussa "digimoduulissa" selvitettiin päälomaketta laajemmin kansalaisten sähköisten palvelujen käyttöä, arvioita keskeisistä kansallisista sähköisistä palveluista sekä selvitettiin sähköisten palveluiden käytön esteitä ja hyötyjä. Kaikkiin toteutettuihin tiedonkeruisiin oli mahdollista vastata suomeksi tai ruotsiksi, väestökyselyyn näiden lisäksi myös englanniksi ja venäjäksi.

Eri tiedonkeruista on julkaistu suomeksi artikkeleita tai raportteja, joissa esitetään laajemmin Sote-tieto hyötykäyttöön -strategia 2020 tavoitteet ja tiedonkeruusta piirtyvää tilannekuvaa. Vuosien 2020–2021 tiedonkeruun tuloksia on julkaistu myös useissa muissa raporteissa sekä vertaisarvioiduissa artikkeleissa. Julkaisujen viitetietoja on tämän raportin lukujen lähdetiedoissa ja hankkeen sivulta (thl.fi/stephanke) löytyy linkki julkasulistaukseen. Useiden indikaattoreiden tuloksia eri tiedonkeruuajankohdilta on mahdollista tarkastella myös dynaamisina tietokantaraportteina (thl.fi/digikyselyt). Hyviä lukuhetkiä!

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Vesa Jormanainen, Päivi Hämäläinen, Jarmo Reponen

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 km^2 with an average population density of 18 persons/km^2 (Statistics Finland 2021). In the eastern and northern parts of the country the population density is especially low and distances are long. In 2022 Finland is divided into 309 municipalities, more than half of which have less than 6 000 inhabitants. (Association of Finnish Local and Regional Authorities 2021a). The large number of small municipalities with big responsibilities for providing both health and social care services has been a unique characteristic of the Finnish health and social service system. The organisation of public healthcare, social welfare and rescue services are under reform in Finland. The responsibility for organising these services transferred from municipalities to wellbeing services counties from 2023. The key objective of the reform is to improve the availability and quality of basic public services throughout Finland. Under the reform, a total of 21 self-governing wellbeing services counties established in Finland. In addition, the City of Helsinki is responsible for organising health, social and rescue services within its own area. (Finnish Government 2022) The self-governing province of the Åland Islands continues to have a responsibility of their regional health services, too (Ministry of Foreign Affairs 2022).

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 welfare and healthcare services for their residents and they have strong decision-making power when organizing the services. Legislation sets out the overall structure for the services provision, as functions of the municipalities, primary healthcare 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 healthcare and social welfare services are procured and purchased from private service providers. In addition, the private healthcare and social welfare providers have occupational

healthcare and private citizens as their clients. Private healthcare services are partially reimbursed by the National Social Security Fund provided the service is purchased by a private person or an organisation. (Ministry of Social Affairs and Health 2022, Keskimäki et al. 2019)

Healthcare and social welfare 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 2022). The overall funding of the Finnish public and private healthcare and social welfare system has also other mixed features (Keskimäki et al. 2019).

In 2019, Finland's health care expenditure amounted to EUR 22.0 billion, with a year-on-year increase of 3.0 per cent in real terms. The per capita expenditure was EUR 3,983. Health care expenditure corresponded to 9.2 per cent of the gross domestic product (GDP), which was 0.2 percentage points more than the year before. Expenditures increased in particular for prescription medicines for outpatient care (+10.1%), primary health care (+4.5%) and long-term care and home care for the elderly and persons with disabilities (+ 4.2%). Special health care (EUR 8.0 billion) constituted the largest single item of health care expenditure. Together with basic health care expenditure (EUR 3.4 billion, incl. outpatient care in primary health care, inpatient care, oral health care, occupational health care, student health care, and services purchased by municipalities and joint municipal authorities from private organisations) these two categories accounted for slightly more than half of all health care expenditure in 2019. Special health care expenditure increased by 2.5% compared to 2018. For long-term care for the elderly and persons with disabilities, expenditure increased by 3.5% from the previous year, amounting to 2.5 billion euros. Home care expenditure, meanwhile, saw an increase of 8.4%. In 2019, public funding accounted for 76.8 per cent and private funding for 23.2 per cent of the health expenditure. The share of public funding increased by 0.8 percentage points from 2018. (THL 2019)

According to the statistics, Finland's social protection expenditure totalled EUR 72.1 billion in 2019. The increase in this expenditure was 1.6 per cent in real terms from the previous year. The per capita expenditure was EUR 13,052. The social protection expenditure in relation to the GDP was 30.0 per cent and rose almost at the same rate as the GDP. Old-age-related expenditure accounted for the greatest share of social protection expenditure, or 42.8 per cent (EUR 30.9 billion). Other major categories of cash benefits are expenditures in sickness, parental (including maternity/paternity) leave, child benefits, disability benefits, unemployment benefits and social assistance. (THL 2022a)

The social welfare and healthcare reform that took place from January 2023 and effects on approximately 7.3 per cent of the working population, mainly those working in the public sector. There were 399,492 persons working in the social welfare and

healthcare services at the end of 2018, of whom 69.0 per cent (275,733 persons) worked in the public sector, 23.7 per cent (94,511) in private sector and 7.3 per cent (29,175) in other sectors. In 2018, 63.5 per cent (140,740 persons) of the social welfare personnel (221,672 persons) worked in the public sector, whereas 79.3 per cent in 2000. The figures for healthcare personnel (177,747 persons) were 75.9 per cent (134,993) in 2018 and 83.4 per cent in 2000, respectively. (THL 2022b)

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. In 2021, there were 134 primary healthcare centres in mainland Finland and one in the Åland Islands. Primary healthcare centres are not necessarily single buildings or single locations; they can be defined as a functional unit or as an organisation that provides primary curative, preventive and public healthcare services to its population. The primary 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 2021b)

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 2022, Keskimäki et al. 2019) 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, other medical specialists, nurses, public health nurses, midwives, social workers, dentists, physiotherapists, psychologists, administrative personnel and so on. A typical primary healthcare centre has 30–60 beds. The number of inpatient departments within a primary healthcare centre varies. The majority of patients in these departments are older people and have long-term illnesses and ailments. (Mikkola et al. 2015) In remote sparsely populated areas, primary healthcare centres provide rather comprehensive short-term curative inpatient services for the general population. Municipalities provide long-term care in wards at primary healthcare centres and non-medical long-term care in institutions for older people. The latter belong to social welfare services.

Alongside the municipal system, there are private and occupational health services (Ministry of Social Affairs and Health 2022). 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. 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 specialist hospital or at a primary healthcare centre (Finnish Medical Association 2019) 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. (Social Insurance Institution of Finland 2017, Ministry of Social Affairs and Health 2022). 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.

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 self-governing province of the Åland Islands forms its own district (Ministry of Social Affairs and Health 2022, Association of Finnish Local and Regional Authorities 2021a, 2021b).

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 70–90 depending on the definitions used in counting: this includes the five university hospitals, 16 other central hospitals and a number of smaller specialised hospitals. Hospital districts own most of the public hospital and some are owned by other municipal arrangements. The population of hospital districts varies significantly from 40,000 to 1,600,000 inhabitants with the exception of Åland Islands (29,000 inhabitants). (Association of Finnish Local and Regional Authorities 2021a, 2021b) Hospital districts also have some administrative responsibilities set in the legislation. 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.)

In addition, some private hospitals provide 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, whereas on the other hand, municipalities purchase public healthcare from many private hospitals.

Social care, work and social welfare services

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).

Table 1. Specific pieces of legislation cover different areas of social care. Social services arranged by municipalities include services, such as the following (Ministry of Social Affairs and Health 2022, Association of Finnish Local and Regional Authorities 2021b)

Areas of social care	Service descriptions
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 vent 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, person with a disability or a long-term 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 (suc as a child or older person) to be cared for at home and in order to meet their individual needs
Rehabilitation	All services involve a rehabilitative approach. Rehabilitative working activities are arranged under municipal social welfare. If a clinet 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, assisting 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, their family and friends

Approximately one third of the overall social welfare services is provided by private social care providers or NGOs (THL 2018a), and a half of the services to the elderly are provided by the private sector service providers including NGOs (THL 2018b). 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 welfare 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.

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 Finnish Institute for Health and Welfare, THL (THL 2018b).

Governance and authorities in social and health care

It is the duty of the [Ministry of Social Affairs and Health](#) to promote the good health and functional capacity of people, healthy environments for life and work and gender equality, and to secure sufficient health and social services and a fair standard of living at the various stages of people's lives. The Ministry of Social Affairs and Health is responsible for the planning, guidance and implementation of health and social policy in Finland. As an organ of the Government, it implements the Government Programme, drafts legislation and key reforms, guides the implementation of reforms and takes care of the Government's staff functions. (Ministry of Social Affairs and Health 2022)

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. The short-term targets (e.g. a government term) and the concrete measures are derived from the performance targets annually. This forms an impact chain, all the way from the impact targets to the concrete measures. For the effectiveness of people's own and joint work, it is important to understand how everyday work promotes the administrative branch's long-term targets. (Ministry of Social Affairs and Health 2022)

The administrative branch of the Ministry of Social Affairs and Health includes several independent institutions and agencies, which implement the ministry's objectives in society and participate in Government Programme projects. 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 of Social Affairs and Health Group includes the Ministry of Social Affairs and Health, the Finnish 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 2022).

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 4-year performance agreement with several of the agencies and institutions.

The duties of [the Finnish Medicines Agency](#) (Fimea) is to maintain and improve the health of the population by supervising and developing the pharmaceutical sector by means of pharmaceutical licensing and monitoring duties, research and development and producing and distributing pharmaceutical information to improve

pharmaceutical services and the effectiveness of pharmacotherapy. The duties of Fimea further include monitoring that healthcare equipment and devices comply with requirements as well as promoting their safe use. (Finnish Medicines Agency (Fimea) 2022)

The National Supervisory Authority for Welfare and Health (Valvira) is the permit and supervisory authority in the social welfare and healthcare sector. Valvira promotes welfare and health through effective supervision by means of guiding and monitoring the activities of social welfare and healthcare professionals and NGOs and dealing with complaints within the sector in accordance with the division of duties with the Regional State Administrative Agencies. In addition, Valvira oversees the implementation of the key requirements of the data systems intended for processing social welfare and healthcare customer and patient data. (National Supervisory Authority for Welfare and Health (Valvira) 2022)

The Finnish Institute for Health and Welfare (THL) is a Finnish expert agency that provides reliable information on health and welfare for decision-making and activities in the field. The Institute studies, monitors, and develops measures to promote the well-being and health of the population in Finland by means of gathering and producing information based on research and register data, providing expertise and solutions to support decision-making. 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. THL is involved in the development of new information management functionality for the reporting and monitoring of the social welfare and healthcare system, and in making various information systems interactive. The Institute is also involved in developing the Kanta (personal health account) service. (Finnish Institute for Health and Welfare (THL) 2022)

The Finnish Institute of Occupational Health (FIOH / TTL) 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, 2022)

There are six Regional State Administrative Agencies in continental Finland. The Regional State Administrative Agency for Åland is the State Department of Åland. The agencies promote the realisation of basic rights and legal protection, accessibility of healthcare and social welfare services, sustainable use of the environment, domestic safety, healthy and safe living and working environments in their operating areas. In addition, the Agencies implement, direct and enforce laws. Operations are governed by legislation and eight ministries. The Agencies act as the regional representative of these ministries and perform duties assigned to the Agencies. The Agencies work in close collaboration with local authorities. (Regional State Administrative Agencies 2022)

[The Social Insurance Institution of Finland](#) (Kela) is also an important organisation for the healthcare and social welfare sector. Kela provides basic social security for all persons resident in Finland throughout the different stages of their lives. Supervised by the Finnish Parliament, Kela is an independent social security institution with its own administration and finances. 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) 2018, Act on Social Insurance Institution 731/2001)

Reform of healthcare, social welfare and rescue services from January 2023

The organisation of public healthcare, social welfare and rescue services are under reform in Finland. The Parliament decision and the President approval in June 2021 transformed responsibility for organising these services from municipalities to well-being services counties from January 2023. The key objective of the reform is to improve the availability and quality of basic public services throughout Finland. Under the reform, a total of 21 new self-governing wellbeing services counties established in continental Finland. In addition, the City of Helsinki is responsible for organising healthcare, social welfare and rescue services within its own area. The joint county authority for the Hospital District of Helsinki and Uusimaa are responsible for organising demanding specialised healthcare separately laid down by law. The autonomous region of Åland Islands remains in charge of its public health care. The ongoing reform is the largest in Finland since 1945. (Finnish Government 2022)

The highest decision-making power in each wellbeing services county exercised by a county council, whose members and deputy members elected in county elections. The first county elections were held on January 23, 2022, and the term of the first county council started on March 1, 2022 and run until May 31, 2025. From 2025 onwards, county elections held every four years in conjunction with municipal elections, and the term of the county council will always start at the beginning of June. Because the City of Helsinki is not a wellbeing services county and it does not belong to any of the counties, there were no county elections in Helsinki. However, non-residents, i.e. people whose municipality of residence is not Helsinki, were able to vote in Helsinki during the advance voting period. (Finnish Government 2022)

The responsibility for organising health, social and rescue services transferred from municipalities to wellbeing services counties from the beginning of 2023. Municipalities remain responsible for promoting the health and wellbeing of their residents. The public sector remain the organiser and primary provider of services. Private sector actors and the third sector supplement public health and social services. Five collaborative areas for healthcare and social welfare created to secure specialised services. People continue to be allowed to use health and social services across regional boundaries. (Finnish Government 2022)

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. (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 27 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 1995 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). The current e-Health and e-Welfare development in Finland presented in this Checkpoint report reflects these strategic objectives.

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. <u>Service system –effective utilisation of limited resources:</u> Client and patient information is accessible to professionals and clients irrespective of changes in organization 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. <u>Refinement of information and knowledge management – knowledge-based management:</u> 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. <u>Steering and co-operation in information management – from soloists to harmony</u>: The structures for steering and cooperation in the area of information management are clear and support the social welfare and healthcare service reform

6. <u>Infostructure – ensuring a solid foundation:</u> Interoperable and modular architecture, information security i.e. accessibility, integrity and protection of data, ensuring sufficient data connections and cooperation in development and procurement.

VISUAL SUMMARY

Opportunities

Service innovation
Holistic health and well-being
Prevention
Personalisation and
segmentation of services
Genetics
Big data
Open data
Cross-sectoral cooperation
Evidence on effectiveness

Enablers

Steering and legislation
Comprehensive planning
Open interfaces and standards
Mobile technology
Service-oriented architecture
Cloud services
Ecosystems for development
Security and data protection

Focus on people
Inclusion,
individualised
services and well-being

Smart tools for professionals
Usability, summaries, decision
support and process
management

Adaptable
processes,
support for
high-quality
work and
services

Technology that
supports personal
well-being and the
system of services

Refinement of
information,
knowledge-
based progress
and management

Quality and availability of services, new operating models,
competence, steering and cooperation

Data repositories: national social and health
information, personal health records, high-quality data

Reliable and scalable information infrastructure
for service production and development

Figure 1. Visual summary of the Finnish e-health and e-social Strategy 2020 (Ministry of Social Affairs and Health 2015)

Although the initial era for the e-health and e-social Strategy 2020 has now ended, its implementation continues at national, regional and local levels. The six strategic themes have been adapted not only to regulatory reform processes but also to procurement processes and service development among health care and social service providers. The health and social reform discussed elsewhere in this publication is one of the beneficiaries of the strategy. Promoting the further implementation of the Strategy 2020 e.g. by improving the citizen´s skills to utilize digitalization has been included to the new 'Promotion of wellbeing, health and safety 2030 Implementation plan' (Finnish Government 2021)

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 on Experiments with Seamless Service Chains in Social Welfare and Health Care Services that 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 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 2022, 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 original 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 into this legislation in 2015, the Client data archive for social welfare services, an extension of the existing Kanta data repository, to include client documents from social welfare services. Another extension which will allow patients to share the data they have themselves stored in their personal health records with health care professionals has been accepted by the parliament in 2021. (Act 250/2014, Act 254/2015, Act 255/2015, Ministerial Act 300/2018, Act 784/2021)

The current healthcare and social welfare information technology infrastructure in Finland

The Finnish information technology infrastructure for healthcare services is based on legislation from 2007 and all its later amendments (Act 159/2007, Act 784/2021). The nationwide, centralised, integrated and shared Kanta Services produces digital services now also for the social welfare services. These services benefit the citizens as well as social welfare and healthcare service providers and pharmacies. You can access the Kanta Services wherever you live in Finland or elsewhere via internet.

Kanta Services is a joint effort. The Kanta Services are available to public and private healthcare services, social welfare services, pharmacies, and citizens. The Kanta Services are developed and expanded in cooperation with several operators including the Ministry of Social Affairs and Health and its administrative branch independent institutions and agencies, the Social Insurance Institution of Finland (Kela), the Digital and Population Data Services Agency (DVV) as well as social welfare and healthcare operators, pharmacies and system suppliers.

The Ministry of Social Affairs and Health is responsible for general strategic guidance and funding of the Kanta Services. STM sets out the target state and roadmap for information management in social welfare and healthcare services and the Kanta Services, and monitors the results. STM takes care of client and stakeholder cooperation at the strategic level and prepares legislation concerning the Kanta Services.

The Social Insurance Institution of Finland (Kela), Kanta Services is responsible for the planning and implementation of the deployment projects for Kanta Services, as well as for communications and client and stakeholder cooperation. Kela coordinates and supports the deployment of Kanta Services and takes care of client cooperation during the use of the service. Kela organises the events and training related to the deployment. Kela is responsible for the maintenance and technical development of the Kanta Services, back-up and support services related to the information

systems, the technical building of the national code service, and the coordination of joint testing.

The Finnish Institute for Health and Welfare (THL), Information Management in Social Welfare and Healthcare functions as the authority in information management in the social welfare and health care sector. It also takes part in Kanta development. THL is responsible for the functional planning of the Kanta Services and supports the functional change. THL participates in deployment activities in the capacity of expert in the contents and operating models in social welfare and health care. It provides support and training for social welfare and health care professionals, for example, in documentation. THL defines the key requirements for Kanta Services and the related information systems. It is responsible for concepts, data structures and classifications.

The National Supervisory Authority for Welfare and Health (Valvira) is responsible for the role and attribute information services based on the data in the central registers of social welfare and healthcare professionals (Terhikki and Suosikki Registers) required in the national information systems, as well as for the so-called Valvira codes.

The Digital and Population Data Services Agency (DVV) is responsible for the ID and certificate services of information system services. Persons who use patient information systems, archiving and electronic prescription services must be identified and authenticated in a reliable way. It must also be possible to sign patient records and prescriptions electronically. The authentication of healthcare professionals and other employees of healthcare service providers, as well as electronic signing by them are enabled with DVV's certification services and management of the access rights of operating units.

The nationwide Kanta services were developed and launched for use in phases (Figure 2). Kanta services include currently the following: My Kanta Pages, Prescription service, Pharmaceutical database, Patient Data Repository, archiving of old patient data, Kelain, Client data archive for social welfare services and Kanta Personal Health Record (Kanta PHR) (Kanta Services 2022a). 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 electronic 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) were added in May 2018. (Reponen et al. 2009, Jormanainen 2018, Jormanainen and Reponen 2020)
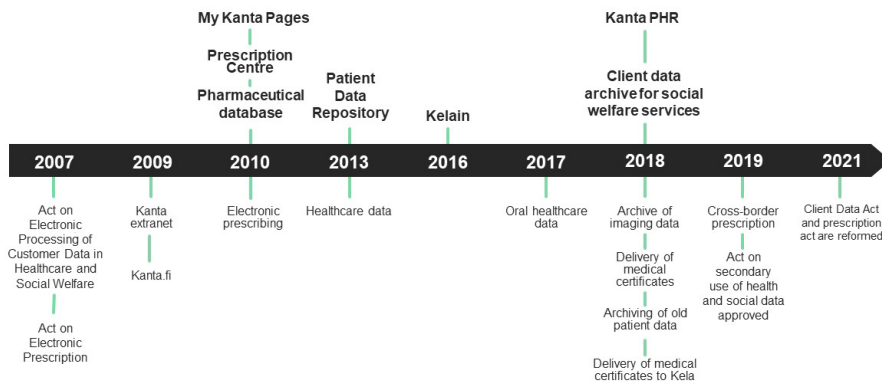
Figure 2. Launch timetable of the most important elements of Kanta services (upper part) and issues (Acts, extranet, kanta.fi webpages and functions; lower part) from 2007 to 2021 (Modified from source: Social Insurance Institution of Finland (Kela) 2022).

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 electronic archiving and the national electronic prescription database (Prescription Centre). Kela is also responsible for the national Pharmaceutical database. Cards for identification of professionals are provided by the DVV supported by information provided by Valvira. Nationally standardised codes and classifications are managed by THL and delivered via the National Code Server. The Finnish national electronic healthcare and social welfare infrastructure is shown in Figure 3. (Reponen et al. 2009, Mäkelä-Bengs and Vuokko 2013, Jormanainen 2018)

Kanta services — Kanta

User groups

Healthcare service providers
Primary care organizations
Hospital districts
Private healthcare providers

Providers of social services

Pharmacies

Healthcare professionals

eHealth Digital
Service Infrastructure

Receivers of
medical certificates

Citizens
and apps used by them

Kelain
Web-based
prescription service

National
Contact Point
for eHealth

National
service bus

My Kanta
pages

Kanta messaging layer

Prescription centre
Prescriptions   Dispensations
Renewals Reservations

Pharmaceutical database
Medicinal products details   Prices
Substitution rules   Reimbursement rules

Patient data repository
Health records   Imaging infrastructure   Archive of legacy patient data
Encounter data   Imaging data   Legacy health records
Structured health records

Data management service
Consent data   Will expressions
Information notices   Living wills
Consents   Organ donation wills
Consent restrictions

Summary service
Problems   Vaccinations   Risks
Procedures   Imaging studies
Lab results   Physiological findings
Customer summary for social services

Data repository for social services
Customer relationships   Service items
Customer documents   Legacy data

Personal Health Record (PHR)
Observations   Questionnaire responses
Other data stored by citizens

Data
lake

Main standards
HL7 V3: CDA R2 L3 and Medical Records
HL7 FHIR (Kanta Personal Health Record)
JSON, XHTML (PHR and social services)
PDF/A (old patient data and social services)
IHE IT-I Profiles (imaging and eHDSI)
W3C XML DSig
WS Addressing, WS-I
TLS, X.509

Other national services

Population register
Demographic data

Suomi.fi
Authentication
e-Authorizations
Message exchange

HCP and SCP register
Professional rights

Certification service
Certificates
Smart cards

National code server

Code systems   Terminologies
Pharmacy register   Data structures
Organization register

Figure 3. Scheme of the most important elements of Kanta services including the national Prescription Centre, Patient Data Repository, Client data archive for social welfare services (Data Repository for social services), Kanta Personal Health Record (Kanta PHR) and My Kanta web pages (Social Insurance Institution of Finland (Kela) 2022).

The structured electronic health records

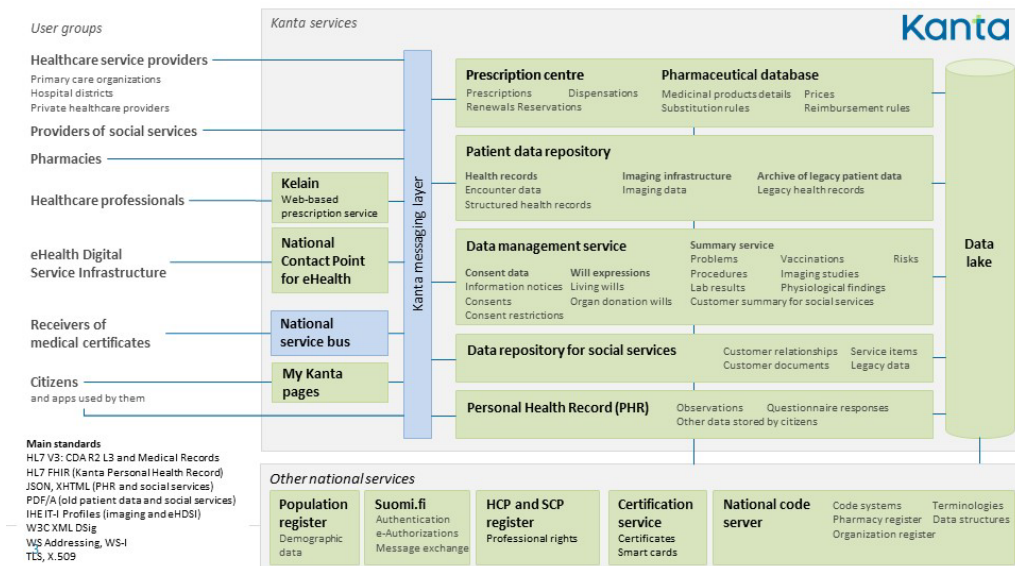The need for structured data instead of prevailing plain narrative text in the patient records was already identified in the Finnish e-health strategy documents in 1998. The electronic patient records project of the National Health Project Programme 2002–2007 worked on the common content and structure of the electronic patient records. The first 'core data' were defined in cooperation with interest groups like the Finnish HL7 Association, professionals, administration and software enterprises (Häyrinen et al. 2004, Hartikainen et al. 2009). The National Code Server was built in 2003–2004 in the Finnish Institute for Health and Welfare (THL), and it has provided the main codes thereafter. The task of maintaining the technical code server application was given to the national Social Insurance Institution of Finland (Kela) in 2007 by legislation, whereas the task of providing code services (codes, classifications and other contents of the National Code Server) remained at the THL (at that time STAKES, National Research and Development Centre for Welfare and Health). The legislation states that electronic patient records that are archived in the national Patient Data Repository and the patient summary must use standardised data structures that are available via the National Code Server. More regulations are given in ministerial acts. (Act 159/2007, Ministerial Act 298/2009 and 11.4. 2012/165, 13.10. 2015/1257). The first

core data set was adopted into large-scale use in 2014. The regulations still leave parts of the patient documents unstructured. In addition to the regulated codes, a large list of other codes has been released from the National Code Server for both regular use and piloting purposes. One important area of this work is structured nursing data. The full implementation of the structured national electronic patient records will take years from the first legislation. The major healthcare and social welfare reform starting 2023 may strongly enhance development of interoperability between data systems.

User organizations participating the national development

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 organizations have been asked since 2011 in the national e-health benchmarking survey how their experts had participated in defining the structures of the national electronic patient records and the same questions were repeated in 2014, 2017 and 2020. 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 results and trends show that specialised care experts from hospital districts have all this time been the most active participants. 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, their 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. They were mostly participated in workgroups or contacted authorities directly. (Winblad et al. 2012, Reponen et al. 2015, Reponen et al. 2018, Reponen et al. 2021)

Social welfare information technology

As part of the national Information Society Program, an electronic welfare programme was launched in 2003 (Finnish Government 2003) to develop social welfare service' information technology (Sahala 2005). A national project (Tikesos) was set up and implemented during 2005–2011 by the Association of Regional and Local Goverments in Finland, Finnish Institute for Health and Welfare (THL), the East Finland Social and Welfare Centre of Expertise, and the University of Eastern Finland. The aim of the national development project was to promote the utilisation and interoperability of information technology in social welfare services, for which the conceptual

bases for interoperability were created. (Sahala et al. 2011, Rötsä et al. 2016) Since 2012, the national development of social welfare information systems has been organised by THL basing the work on the Tikesos project conceptual foundation. Already 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 electronic welfare information solutions were passed in 2015 (Act 255/2015).

A nationwide Client data repository for social welfare services with other nationwide electronic welfare information services are under preparation. Implementation of the nationwide Client data repository for social welfare services started on voluntary basis in May 2018. According to the recently introduced Act on Electronic Client Data Processing in Social Welfare and Healthcare (Act 784/2021) that became effective November 1, 2021 states that social welfare service providers must subscribe these services by September 1, 2024, and private social welfare service providers by January 1, 2026. After adoption of the nationwide Kanta Services for social welfare service providers, documents must be recorded into the Client data repository for social welfare. The nationwide Kanta Services for social welfare are implemented in four phases. In phase 1, documents are recorded in pdf-format and they are accessible only by organisations that recorded them. In phase 2, basic functionalities are expanded and structured documents are recorded into the Client data repository. In phase 3, documents are accessible by registries. In phase 4, cooperation and interoperability between registries (organisations) are in place, and reporting functions are launched. The first 11,000 social welfare services client documents were archived in the national data repository in May 2018. (Jormanainen 2018) Currently, there are some over 25 million documents from over 650,000 persons in the national Data repository for social welfare services. The implementation of structured nationwide sharable and interoperable electronic welfare documents is expected to take over 10 years from the first pieces of legislation.

In 2020, almost all of the social welfare organisations provided information about social services electronically. The provision of electronic services was more common in the public sector than in the other sectors. Almost all of the public social welfare organisations had an electronic client information system in place, while one-quarter of the non-public organisations were still operating without this system. Data transfer between information systems was limited, but public sector employees had access to the information systems that was necessary for their work. Client-related data were generally easily available, whereas the availability of productivity, impact and quality indicator data was rather poor, especially in the public sector. As a whole, only slight progress seems to have been made in social welfare information management since the 2017 report. (Salovaara et al. 2021)

Electronic prescribing

Half of the community pharmacies in Finland used automatized data processing systems already in early 1980s and all community pharmacies in 1998. A smartcard-based technology experiment (1989–1993) in Turku and Tampere tested in prescription data transfer from physicians to community pharmacies. Electronic prescription was developed further in software pilots (1994–1998) in Oulu and Helsinki and in four rural municipalities. Electronic prescription was also included in the Satakunta Macro Pilot program (1998–2001). The Ministry of Social Affairs and Health proposed June 15, 2001 that the Kela and the Finnish Medicines Agency would start to assess requirement for developing electronic prescription for Finland. Preliminary assessment results were published in late 2001 and they laid the grounds for the current national Prescription Centre services. Finland carried out the first national electronic prescribing pilot programme during 2002–2006, during which 1,075 electronic prescriptions were issued in two years (Hyppönen et al. 2006). Legislation on the use of electronic prescriptions also came into effect in 2007 (Act 61/2007). The legislation on electronic prescriptions was set to improve patient and medication safety and prescribing efficiency with reference to some systems already implemented in other countries.

Nationwide use of electronic prescriptions in 27 European Union Member States in 2009 was not more common than in 2003 (Mäkinen et al. 2011). Only Denmark and Sweden had electronic prescriptions in daily use in 2003, whereas Belgium (local hospital pharmacies), Denmark (national), the Netherlands (regional), Spain and Sweden have used them daily since 2009. Electronic prescriptions were in daily use in 19 European Union Member States in 2018, including Finland (Bruthans 2020).

Most physicians and dentists and some nurses use electronic patient record applications and prescriptions produced electronically within the applications. A web-based direct access (Kelain application) and some commercial applications are also available for physicians and dentists. The electronic prescriptions are sent encrypted from the physician's surgery to the national Prescription Centre repository hosted by Kela. All the community pharmacies are able to access the electronic prescriptions for purposes of dispensing. Finnish electronic prescribing is electronic and fully integrated with the certified electronic patient record applications and the national centralised Pharmaceutical Database; this ensures that the system contains continuously updated knowledge about all medication prescribed to patients, using highly secured networks (Reponen et al. 2008). The current Kanta system architecture is presented in Figure 3.

By the end of 2012, all the pharmacies had to subscribe the national Prescription Centre services. The deadline for the public health service providers was by 2013. Private healthcare service providers were due to subscribe the electronic prescribing services in two phases: providers prescribing more than 5,000 prescriptions annually were due to subscribe the services by April 1, 2014 whereas the rest by January 1,

2017 when electronic prescribing became mandatory for all. All pharmacies, public healthcare providers and 1,268 private healthcare providers had subscribed the Prescription Centre services by December 31, 2017. (Act 61/2007, Jormanainen 2018).

Currently all prescriptions are issued and dispensed electronically via the national Prescription Centre services. Prescriptions on paper or via telephone are exceptions, and the reason for their issuing has to be recorded into the system for evaluation. Telephone or paper-based prescriptions are recorded as electronic prescriptions to the Prescription Centre at community pharmacies during medication dispensing. In 2017, altogether 31.9 million new electronic prescriptions were recorded, out of which community pharmacies recorded 0.30 million (0.9%) paper and 0.14 million (0.4%) telephone prescriptions into the Prescription Centre. Respective figures were 26.4 million, 0.13 million (0.5%) and 0.13 million (0.5%) in 2020. The full implementation of the Finnish nationwide Prescription Centre services from the legislation to full deployment took 10 years. (Act 61/2007, Jormanainen 2018, Jormanainen et al. 2020)

Sharing patient documentation in the Kanta services

The national architecture consists of local electronic patient records using common and mandatory national data structures and technical standards, and the national Kanta Services' data repositories in which all electronic patient records and patient summaries are available online following patients' consent. Data are transferred over the Internet via a VPN (virtual private network) or SSL (secure socket layer) secured connection between the central organisations and healthcare providers. Joining the national Kanta services (Figure 3), is mandatory for all public healthcare providers and pharmacies. Private social welfare service providers using electronic documentation (Act 159/2007) also have to subscribe the national Kanta Services.

The first public healthcare service providers subscribed the nationwide Patient Data Repository services in late 2013, and all public healthcare providers subscribed the services by end 2015. Oral healthcare providers' patient records archiving into the Patient Data Repository was launched in May 2017. (Jormanainen 2018) In the Patient Data Repository, there were in December 31, 2020 altogether 2202 million documents from 6.2 million persons, of whom 4.1 (65%) million had given their consent to share their data between health care service providers. (Kanta Services 2022b).

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. 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 (Jormanainen et al. 2019), increasing to approximately two million persons per month during the peak of COVID-19 pandemic in 2021 and averaging to one million persons per month in 2022 (Kanta Services 2022).

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 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 building phase was originally fiscally supported by the Ministry of Social Affairs and Health but the services are now financed by the hospital districts themselves. The services have been built by 1,500 health care, IT, data and communications professionals from the university hospitals together with patients. In 2022 there are 33 virtual hubs built around different themes. The hubs offer free information and support to citizens. The hubs' range of services includes various chats, chatbots and symptom navigators. There are over 140 digital care pathways for different patient groups published in different hospital districts. In My Path services one can find remote appointments and self-care programs, too.

HealthVillagePRO is a service portal for social and health care professionals. There are about 600,000 visits to the open websites every month, and the amount is increasing. (Healthvillage.fi 2022)

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). The Ministry of Social Affairs then supported primary healthcare self-care service development in major cities, which resulted in the Omaolo -service. Omaolo service enables citizens to start using many public social welfare and healthcare services quickly and easily. It includes electronic symptom checkers, service assessments, personal service activities, periodic check-ups, electronic health check, well-being check-up and well-being coaching programmes. (Omaolo.fi 2022). One of the most popular Omaolo services is the Coronavirus symptom checker. Many Omaolo services are linked to Kanta services, electronic patient records and other electronic services (e.g. appointment, laboratory test results). In addition, the Omaolo 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. This was very useful during the coronavirus pandemic, when in some cities citizens could send their coronavirus symptom checker results to primary health care centres for further processing (Jormanainen & Soininen 2021). The Omaolo services can be seen as a continuation of previous self-care and appointment services, bringing more intelligence into those services. (Kouri et al. 2018)

The current governance structure of the national electronic health and electronic welfare infrastructure

At the strategic level, steering of the national electronic health and electronic 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 Finnish 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 electronic health system. For this work, THL founded a specific unit, the Unit for the Operational Management of Health and Welfare Information (OPER) in 2011 that operated as a national coordinating function for implementation of the national Kanta Services, supported by legislative mandate to the end of 2019. (Hyppönen et al. 2011, Jormanainen 2018)

The coordinating function at THL had close working relationships and cooperation with several national actors as well as health and social welfare care service providers, pharmacies and system suppliers. The coordinating function worked 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 had also granted state subsidies to provide partial funding for breakthrough pilots (Jormanainen 2018).

In addition, other important stakeholders in the development of the national electronic health and electronic welfare infrastructure include the Association of Finnish Local and Regional Authorities that support the implementation of the national health and social care information systems for example by having launched forums like AKUSTI-forum to support the development and to maintain an ongoing innovative discussion on practical questions between care organisers, providers and the State authorities. (Association of Finnish Local and Regional Authorities 2022)

The Ministry of Finance also has a role in the governance of healthcare and social welfare information technology. The Act on Information Management Governance in Public Administration (Act 634/2011) came into force on June 9, 2011. It is an enterprise architecture approach: it 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 Ministry of Finance steers 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. Each ministry steers the development of information management and related projects in its own administrative branch. The Public Sector ICT Department 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. (Ministry of Finance 2022)

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 JAseHN and eHAction (eHAction 2022). Finland was participating in a Connecting Europe Facility project and built the cross-border e-prescription infrastructure, where the first e-prescription service was taken into use between Finland and Estonia in January 2019 (Ministry of Social Affairs and Health et al 2019). Finnish patients were then the first EU citizens that could use their e-Prescriptions in another country (European Commission 2019a). Finland

participates also in work on e-health benchmarking and information infrastructure guidance by the Organisation for Economic Co-operation and Development (OECD). Together with other Nordic countries Finland is active in the Ministerial Working Group on e- health under the Nordic Council of Ministers. A Nordic eHealth research network (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 was to benchmark the deployment and use of health IT within the Nordic countries. The e-health group established the Nordic e-health Research Network (NeRN) 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.(Finnish Institute for Health and Welfare 2020)

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 evidence informed policies by developing key indicators for monitoring future e-health outcomes and citizen experiences (Nøhr et al. 2020).

Comparing national patient portals

Denmark, Finland, Norway and Sweden have compared their national health portals (sundhed.dk, My Kanta Pages, helsenorge.no and 1177.se) in 2019–2021 (The Norwegian Directorate of eHealth 2021). Since their inception, the four tracked portals have grown on average 29–70% annually. The portal brands are very strong. The COVID-19 pandemic has affected citizens' portal usage since early 2020 and introduced new functionalities, such as self-diagnosing chatbots and automated COVID-19 laboratory test results. Based on the tracked four national health portals, citizens in

the Nordic countries follow their own health via their portals. In addition, more administrative tasks are done digitally, such as appointments, review of medication lists and renewing electronic prescriptions as the most used services. Access to electronic health records is also among the top services used by citizens. Citizens visit their portals 8–18 times per year, and actual logins take place 5–9 times per year by using typically national or bank IDs.

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.

In Finland, the pilot and further implementation effort was led by Finnish 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 organization 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.

OECD has evaluated the readiness of electronic health record systems to contribute to national health information and research in its working papers. In 2017 OECD reported that countries with the highest technical and operational readiness, such as Finland, Singapore, Estonia, Slovakia and England (United Kingdom) are in the best position to develop national health information from data within EHRs (Oderkirk 2017). Presenting data collected just before the onset of COVID-19 pandemic, the 2021 OECD working paper reports that the countries having the strongest indicators of key national health dataset availability, maturity and use are Denmark, Korea, Sweden, Finland, and Latvia (Oderkirk 2021).

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, together with Denmark, Estonia and Sweden. 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. (Sabes Figuera et al 2013).

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. (Codagnone and Lupiañez-Villanueva 2013). In 2018 the repeated analyses with a random sample of 5,793 GPs showed that, overall, eHealth adoption in primary healthcare in the 27 EU member states has increased from 2013 to 2018, but that there are differences among the countries surveyed. In countries with the highest level of adoption (Denmark, Estonia, Finland, Spain, Sweden and the United Kingdom), the use of eHealth is routine among GPs. (European Commission 2019b).

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 784/2021) 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 eHealth and eWelfare services. National monitoring and benchmarking surveys have been conducted in collaboration of the Ministry, universities (University of Oulu, University of Eastern Finland, Aalto University, University of Lapland) 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, Monitoring and assessment of social welfare and health care information system services (STePS). In 2014, there were 4 surveys under the umbrella: organisational survey of availability and use of eHealth, organisational survey of availability and use of eWelfare, physician experiences of eHealth and citizen experiences on eHealth. In 2017 data collection (STePS 2.0), national survey of nurses' experiences was added to the survey palette. In 2020 – 2021 data collection, a national survey of social welfare professionals´ experiences of eWelfare further extended the perspective. (THL 2022c).

All these 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 2020 - 2021 data collection round and key changes from earlier surveys.

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 e.g. 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 a Department of Health and Social Management. The key research themes at the department are the management, organisation, economics, informatics, and effectiveness of health and social services. (University of Eastern Finland 2022a). 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 belonging to the Research Unit of Medical Imaging, Physics and Technology, from year 2023 forwards to Research Unit of Health Sciences and Technology (University of Oulu 2022a). 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 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. The Faculty of Medicine has also established in 2018 a DigiHealth Knowledge Hub activity through its Centre for Health and Technology to support research and innovation collaboration with enterprises in digital health solutions assessment, data analytics and data practices, and artificial intelligence exploitation (University of Oulu 2022b, 2022c).

The Tampere University has in its faculties of Information Technology and Communication Sciences and Medicine and Health Technology have research groups focusing on Medical Informatics research (Tampere University 2022a). In addition, an Institute of Biosciences and Medical Technology, BioMediTec, is a cross-scientific research and educational institute serves as a platform for innovations, technology transfer and industrial collaboration in area of health and life sciences. (Tampere University 2022b).

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 2022).

Aalto University, Department of Computer Science, in their research area of Human-Computer Interaction and Design (HCID), also applies research in the field of usability of healthcare IT systems, as well as in user-centred healthcare service design (Kaipio 2011, Aalto University 2022).

Studies in health informatics is have been offered in the University of Eastern Finland since 2000 as a Master's degree programme in Health and Social Care Information Management. The emphasis has been on training healthcare practitioners to acquire the necessary IT skills for their daily tasks. It was the first master's degree programme in the world to be certified by the International Medical Informatics Association. (University of Eastern Finland 2022b)

Since 2017 Savonia university of Applied Sciences has offered a 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 internationally to healthcare staff, engineers and business and administration personnel working near e-health field. (Kouri et al. 2018, Savonia 2022)

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 telemedicine solutions as a part of the national healthcare information systems (University of Oulu 2022d). 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 2022e). 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) is a national member of the International Society for Telemedicine and e-health (ISfTeH) and the Nordic Telemedicine Association. The Finnish Social and Healthcare Informatics Association (FinnSHIA) 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. The Association of Finnish Local and Regional Authorities 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, Finnish Dental Association, and Finnish Veterinary Association together with FSTeH have established a special competence for healthcare information technology since 2013 for Finnish physicians, since 2015 for dentists and since 2018 for veterinarians respectively (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. In November 2022 already 84 physicians, 13 dentists and one veterinarian 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. Originally, they had a learning exhibition where a range of major ICT companies and start-up enterprises displayed their novel innovations in the Oulu University Hospital Testlab environment. Finally, the students evaluated the expected feasibility of those solutions for real life working situations. (Honkanen 2017). Today this short course is provided in an on-line learning environment as a multiprofessional course for both medical and nursing students (Veikkolainen et al. 2022).

MEDigi was a Finnish national project that aims for digitalisation and harmonisation of teaching in medical and dental undergraduate studies. MEDigi was 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 harmonised the core teaching contents of the various medical and dental specialities, created a national on-line environment and a national data repository for sharing of the digital learning materials, produced and piloted learning materials as well as developed electronic exam and assessment methods. MEDigi provided on-line courses and guidance to improve the pedagogical skills of teachers in digital environments, too. Moreover, MEDigi supported future physicians and dentists in their professional environment by creating thematic topics of e-health teaching and by organizing local and cross-institutional teaching of e-health usage. MEDigi was a joint project between all of Finland's medical faculties and was coordinated by the University of Oulu. All

the participating universities have made an agreement to continue the collaboration even after the project. (Reponen 2019, Tuovinen et al. 2021, Levy & Reponen 2021).

SotePeda 24/7 was another higher education digitalisation development project financed by the Finnish Ministry of Education and Culture in 2018-2020 which aimed to develop digital social and health service competence specifications for different fields of higher education and create shared digital social and health services studies. In addition, it created pedagogical solutions, a competence badge system, and learning environments for the national network of higher education institutions. SotePeda 24/7 was a collaboration project between 24 universities of applied sciences providing education and training in social and health care sector, and it was coordinated by the Laurea University of Applied Sciences. (Ministry of Education and Culture 2018, Värri et al. 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) 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, Liljamo et al. 2020).

References

Aalto University (2022) Department of Computer Science, Human-Computer Interaction and Design. A Website. Available at: https://www.aalto.fi/en/department-of-computer-science/human-computer-interaction-and-design (accessed 15.11.2022).

Association of Finnish Local and Regional Authorities (2021a) Finnish municipalities and regions. Available at: https://www.localfinland.fi/finnish-municipalities-and-regions (accessed 15.11.2022).

Association of Finnish Local and Regional Authorities (2021b) Kuntien sosiaali- ja terveystoimen hallinto. (in Finnish) [Administration of municipal social and health services] Available at: https://www.kuntaliitto.fi/sosiaali-ja-terveysasiat/palveluiden-jarjestaminen-ja-tuotta-minen/kuntien-sosiaali-ja-terveystoimen-hallinto (accessed 20.4.2022).

Association of Finnish Local and Regional Authorities (2022) AKUSTI, Alueiden ja kuntien sosiaali- ja terveydenhuollon tietohallintoyhteistyöfoorumi (in Finnish) [Social and healthcare information management cooperation forum of regions and municipalities] Available at: https://www.kuntaliitto.fi/sosiaali-ja-terveysasiat/tiedonhallinta/akusti (accessed 15.11.2022).

Adler-Milstein J, Ronchi E, Cohen G, Pannella Winn L, Jha A (2013) Benchmarking Health IT among OECD countries: better data for better policy. Jam Med. Inform Assoc, 0, pp. 1-6.

Bruthans J. The state of national electronic prescription systems in the EU in 2018 with special consideration given to interoperability issues. Int J Med Inform 2020;19:259–266.

Codagnone C, Lupiañez-Villanueva F (2013) Benchmarking Deployment of eHealth among General Practitioners – Final report. European Commission. Directorate-General of Communications Networks. Content & Technology. Available at: https://digital-strategy.ec.europa.eu/en/library/benchmarking-deployment-ehealth-among-general-practitioners-2013-smart-20110033 (accessed 13.11.2022).

eHAction 2022 eHAction / Joint Action Supporting The Ehealth Network. Available at: http://ehac-tion.eu/joint-action/ (accessed 21.04.2022).

EHTELconnect (2013) Peer Review, eHealth Strategy and Action Plan of Finland in a European Context. Workshop report. Helsinki Finland 26-27 February 2013. Ministry of Social Affairs and Health, Reports and Memorandums 2011:11. Available at: https://julkaisut.valtioneu-vosto.fi/handle/10024/74720 (accessed 15.11.2022).

European Commission (2019a) First EU citizens using ePrescriptions in other EU country. European Commission - Press release. Available at: http://europa.eu/rapid/press-release_IP-18-6808_en.htm (accessed 21.04.2022).

European Commission, Directorate-General for Communications Networks, Content and Technol-ogy, Folkvord, F., Hocking, L., Altenhofer, M., et al. (2019b) Benchmarking deployment of eHealth among general practitioners (2018) : final report. Publications Office. Available at: https://data.europa.eu/doi/10.2759/511610 (accessed 15.11.2022).

Sabes Figuera R, Maghiros I, authors Abadie F, editor. (2013) European Hospital Survey: Bench-marking deployment of e-Health services (2012–2013) Synthesis of Outcomes. EUR 26355. Luxembourg (Luxembourg): Publications Office of the European Union. JRC85854. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC85854 (accessed 21.04.2022).

Finnish Institute for Health and Welfare (THL) (2020) Nordic eHealth Research Network (NeRN). Available at: https://thl.fi/en/web/thlfi-en/research-and-development/research-and-pro-jects/nordic-ehealth-research-network-nern (accessed 15.11.2022).

Finnish Institute for Health and Welfare (THL) (2022) Webpage: https://thl.fi/en/web/thlfi-en (ac-cessed 15.11.2022).

Finnish Government (2002) Government Decision in Principle by the council of state on securing the future health care, VNp (2002), printed brochure.

Finnish Government (2003) Prime Minister Matti Vanhanen's Government. Government Pro-gramme 24.6.2003. http://valtioneuvosto.fi/documents/10184/369117/The+Programme+of+the +Government+of+Prime+Minister+Matti+Vanhanen/44c2e542-c5fd-4518-836d-796b26a07dc2 (accessed 15.11.2022).

Finnish Government (2021) Hyvinvoinnin, terveyden ja turvallisuuden edistäminen 2030: Toimeen-panosuunnitelma. (In Finnish with an English summary) [Promotion of wellbeing, health and safety 2030 Implementation plan] Available at: http://urn.fi/URN:ISBN:978-952-383-670-9 (ac-cessed 15.11.2022).

Finnish Government (2022) Sote-uudistus. Health and social services reform. Frontpage. Webpage: https://soteuudistus.fi/en/frontpage (accessed 20.4.2022).

Finnish Medicines Agency (Fimea) (2022) Webpage: https://www.fimea.fi/web/en/frontpage (ac-cessed 15.11.2022).

Finnish Medical Association (2019) Physicians 2019, Statistics on Physicians. Available at: https://www.laakariliitto.fi/site/assets/files/5256/sll_taskutilasto_en_220620.pdf (accessed 15.11.2022).

Hartikainen K, Häyrinen K, Luomala T, Komulainen J, Porrasmaa J, Suhonen M (2009) Kansallisen sähköisen potilaskertomuksen vakioidut tietosisällöt. Opas ydintietojen, otsikoiden ja näkymien sekä erikoisala- ja toimintokohtaisten rakenteisten tietojen toteuttaminen sähköisessä potilasker-tomuksessa Versio 3.0. Available at: https://docplayer.fi/94651-Kansallisen-sahkoisen-potilask-ertomuksen-vakioidut-tietosisallot.html (in Finnish) (accessed 15.11.2022).

Healthvillage.fi (2022) A website. Available at: https://www.terveyskyla.fi/en (accessed 14.11.2022).

Honkanen JP (2017) Hands-on eHealth For Medical Students. HiMMS Europe Insights 5(4):42-43.

Hyppönen H (editor) (2006). (Abstract in English). Evaluation of the National Electronic Prescrib-ing Pilot II 2005-2006). STAKES, Reports 11/2006. Helsinki, 2006.

Hyppönen H, Iivari A, Ahopelto M (2010) Sosiaali- ja terveydenhuollon sähköisen asioinnin hank-keet Suomessa 2010. [Social welfare and health e-services projects in Finland, 2010.] National Institute for Health and Welfare (THL). Report 31/2011, Helsinki, Finland 2011.

Hyppönen H, Viitanen J, Reponen J, Doupi P, Jormanainen V, Lääveri T, Vänskä J, Winblad I, Hämäläinen P (2011) Large-scale eHealth systems: Providing information to support Evidence-

based management. eTELEMED2011: The Third International Conference on eHealth, Tele-medicine, and Social Medicine. February 23-28, 2011 -Gosier, Guadeloupe, France.

Hyppönen H, Faxvaag A, Gilstad H, Hardardottir G.A, Jerlval, L, Kangas M, Koch S, Nohr C, Pehrsson T, Reponen J, Walldius Å, Vimarlund V (2013) Nordic e-health Indicators: Organisa-tion of research, first results and plan for the future. Oslo: Nordic Council of Ministers.

Hyppönen H, Kangas M, Reponen J, Nohr C, Villumsen S, Koch S, Hardardottir G, Gilstad H, Jerlvall L, Pehrsson T, Faxvaag A, Andreassen H, Brattheim B, Vimarlund V, Kaipio J (2015) Nordic e-health Benchmarking. Status 2014. TemaNord 2015:539. Copenhagen: Nordic Council of Ministers.

Hyppönen H, Koch S, Faxvaag A, Gilstad H, Nohr C, Audur Hardardottir G, Andreassen H, Bertel-sen B, Kangas M, Reponen J, Villumsen S, Vimarlund V (2017) Nordic eHealth benchmarking. From piloting towards established practice. TemaNord 2017:528. Copenhagen: Nordic Council of Ministers. Available at: https://norden.diva-por-tal.org/smash/get/diva2:1093162/FULLTEXT01.pdf (accessed 14.11.2022).

Hämäläinen P, Tenhunen E, Hyppönen H, Pajukoski M (2005) Experiences on Implementation of the Act on Experiments with Seamless Service Chains in Social Welfare and Health Care Ser-vice. Discussion Papers 5/2005. Stakes. Helsinki, 2005.

Hämäläinen P, Hyppönen H (2006) Sosiaali- ja terveydenhuollon tietoteknologian hyödyntämis-strategian pitkän aikavälin toimeenpano (The long term implemetation of the eHealth and eW-elfare strategy, in Finnish only). Sosiaalilääketieteen aikakauslehti 2006:43 p.111-123.

Häyrinen K, Porrasmaa J, Komulainen J, Hartikainen K (2004) Sähköisen potilaskertomuksen yh-denmukaiset rakenteiset ydintiedot – Loppuraportti 3.2.2004. osaavien keskusten verkoston jul-kaisuja 5/2004. (in Finnish).

Jormanainen V (2018) Large-scale implementation and adoption of the Finnish national Kanta ser-vices in 2010–2017: a prospective, longitudinal, indicator-based study. Finnish Journal of EHealth and EWelfare, 10(4), 381–395. https://doi.org/10.23996/fjhw.74511 .

Jormanainen V, Parhiala K, Niemi A, Erhola M, Keskimäki I, Kaila M (2019) Half of the Finnish population accessed their own data: comprehensive access to personal health information online is a corner-stone of digital revolution in Finnish health and social care. Finnish Journal of EHealth and EWelfare 11(4):298–310. https://doi.org/10.23996/fjhw.83323 .

Jormanainen V, Relander T, Jormanainen V, Lindgren M (2020) Decreasing number of medication prescriptions after e-prescriptions became mandatory and their valid period was extended: a big bang policy change in Finland in 2017. Stud Health Technol Inform 270:833–837.

Jormanainen V and Reponen J (2020) CAF and CAMM analyses on the first 10 years of national Kanta Services in Finland. Finnish Journal of EHealth and EWelfare 12(4):302–315. https://doi.org/10.23996/fjhw.98548

Jormanainen V & Soininen L (2021) Use and users of the web-based Omaolo Covid-19 symptom self-assessment tool in Finland since March 16, 2020 in Public Health and Informatics. Proceed-ings of MIE 2021, IOS PRESS, pp. 739-743. https://doi.org/10.3233/SHTI210270

Kanta Services (2022a) What are the Kanta Services? Available at: https://www.kanta.fi/en/what-are-kanta-services (accessed 15.11.2022).

Kanta Services (2022b) Statistics. Available at: https://www.kanta.fi/en/statistics (accessed 15.11.2022).

Kaipio J (2011) Usability in Healthcare: Overcoming the Mismatch between Information Systems and Clinical Work. Academic dissertation. Aalto University 2011. http://lib.tkk.fi/Diss/2011/isbn9789526043340/isbn9789526043340.pdf (accessed 15.11.2022).

Keskimäki I, Tynkkynen LK, Reissell E, Koivusalo M, Syrjä V, Vuorenkoski L, Rechel B, Karani-kolos M (2019) Finland: Health system review. Health Systems in Transition 21(2):1–166. https://eurohealthobservatory.who.int/publications/i/finland-health-system-review-2019 (ac-cessed 20.4.2022).

Kilpeläinen A, Päykkönen K (2014) Connecting eCompetence skills to social work: The SIMO III case as an eEducation project. In book Kilpeläinen A Päykkönen K (edit) eCompetence for social work. Publications in the social sciences. B, research reports 64. Rovaniemi: Lapin yliopisto, 109–120. http://urn.fi/URN:ISBN:978-952-484-758-2 (accessed 21.10.2022).

Kouri P, Reponen J, Ahonen O, Metsäniemi P, Holopainen A, Kontio E (2018) Telemedicine and eHealth in Finland. On the Way to Digitalization – In book: Individual TeleHealth Applications to Connected Health. Jordanova M, Lievens F, Vladzmyrskyy A (eds.). A Century of Telemedicine: Curatio Sine Distantia et Tempora A World Wide Overview – Part II. ISBN 987-619-90601 – 3 -1. page 29 – 63. International Society for telemedicine & eHealth. Sofia. https://www.isfteh.org/files/media/A_Century_of_Telemedicine_Part_II.pdf (accessed 14.09.2022).

Levy A, Reponen J. (eds.) (2021) Digital transformation of medical education: MEDigi project report. University of Oulu 2021. http://jultika.oulu.fi/Record/isbn978-952-62-3245-4 (accessed 21.10.2022).

Liljamo P, Ahonen O, Suutarla A, Saranto K (2017) Hoitotyön tiedonhallinnan erityispätevyys. [Nursing specialty certificate in Nursing Informatics, contain English abstract] Finnish Journal of EHealth and EWelfare, 9(1), 37-41. https://doi.org/10.23996/fjhw.61046 (accessed 21.08.2022

Liljamo P, Suikkala A, Suutarla A (2020) Hoitotyön tiedonhallinnan erityispätevyys. Available at: https://sairaanhoitajat.fi/wp-content/uploads/2020/06/HOTA_KRITEERIT_2020.pdf (accessed 15.11.2022).

Mikkola, Merja; Rintanen, Hannu; Nuorteva, Leena; Kovasin, Merja; Erhola, Marina (2015). Valtakunnallinen sosiaali- ja terveydenhuollon laitospaikkaselvitys (National report on social welfare and health care institutional beds, abstract in English). THL Raportti 8/2015 http://urn.fi/URN:ISBN:978-952-302-472-4 (accessed 15.11.2022).

Ministry of Education and Culture (2018) Higher education development projects 2018-2020. Available at: https://minedu.fi/documents/1410845/8943366/Higher+education+development+projects+2018-2020 (accessed 21.10.2022).

Ministry of Finance (2022) Public Sector ICT web pages https://vm.fi/en/public-sector-ict t (in English) (accessed 7.9.2022).

Ministry of Foreign Affairs (2022) The special status of the Åland Islands. Available at: https://um.fi/the-special-status-of-the-aland-islands (accessed at 20.4.2022).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (1995) Sosiaali- ja terveydenhuollon tietoteknologian hyödyntämisstrategia. Työryhmämuistioita 1995:27. (In Finnish) Available at: http://urn.fi/URN:NBN:fi-fe201504226382 (accessed 21.04.2022).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (1998) Sosiaali- ja terveysministeriö. Sosiaali- ja terveydenhuollon tietoteknologian hyödyntäminen; saumaton hoito- ja palveluketju, asiakaskortti. Sosiaali- ja terveysministeriön työryhmämuistioita 1998:8, Helsinki. (In Finnish).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (2003) Sähköisen potilasasiakirjajärjestelmien valtakunnallinen määrittely ja toimeenpano. Sosiaali- ja terveysministeriön työryhmämuistioita 2003:38 (Abstract in English).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (2004) Sähköisten potilasasiakirjajärjestelmien toteuttamista ohjaavan työryhmän loppuraportti. STM Työryhmämuistioita 2004:18. Sosiaali- ja terveysministeriö, Helsinki, 2004. (Abstract in English).

Ministry of social affairs and health (Sosiaali- ja terveysministeriö) (2011) Ministry of Social Affairs and Health and Related Authorities. Brochures in English 2011. Available at: http://urn.fi/URN:ISBN:978-952-00-3323-1 (accessed 15.11.2022).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (2015) Information to support well-being and service renewal. eHealth and eSocial Strategy 2020. Edita Prima, Helsinki. Available at: http://urn.fi/URN:ISBN:978-952-00-3575-4 (accessed 21.04.2022).

Ministry of Social Affairs and Health, Social Insurance Institution Kela, National Institute for Health and Welfare THL (2019) Holders of an electronic prescription written in Finland can buy medicines in European pharmacies. Press release available at: https://valtioneuvosto.fi/en/artikkeli/-/asset_publisher/1271139/suomalaisella-sahkoisella-reseptilla-voi-hakea-laakkeita-europalaisista-apteekeista (accessed 15.11.2022).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (2022) Social and health services. Website: https://stm.fi/en/social-and-health-services (accessed 20.4.2022).

Mäkelä-Bengs P, Vuokko R (2013) Code service in social and health care - process description of the THL code service, Directions 19/2013, THL   http://urn.fi/URN:ISBN:978-952-302-042-9 (accessed 15.11.2022).

Mäkinen M, Rautava P, Forsström J, Äärimaa M. (2011) Electronic prescriptions are slowly spreading in the European Union. Telemed eHealth 17:1–6.

National Supervisory Authority for Welfare and Health (Valvira) (2022). Webpage: https://www.valvira.fi/web/en/front-page (accessed 21.04.2022).

Nykänen P, Hartikainen K, Hämäläinen P, Häyrinen K, Iivari A, Itkonen P, Korhonen M, Pakarinen V, Ruotsalainen P, Saranto K, Ensio A, Forsell M (2006) Yhteenveto: Kansallisen terveysprojektin tietoteknologiahankkeiden katselmointi 2006, 30s. (in Finnish).

Nykänen P, Ohtonen J, Seppälä A (2008) Viitetietokantaan perustuvien aluetietojärjestelmien nykytila, roolit ja mahdollisuudet kansallisen arkkitehtuurin kehityksessä. Tampereen yliopisto, Tietojenkäsittelytieteen laitos, Julkaisusarja B, B-2008-1, Tampere 2008, ISBN 978-951-44-7471-2. (in Finnish).

Nøhr C, Faxvaag A, Tsai CH, Harðardóttir GA, Hyppönen H, Andreassen HK, Gilstad H, Jónsson H, Reponen J, Kaipio J, Øvlisen MV, Kangas M, Bertelsen P, Koch S, Villumsen S, Schmidt T, Vehko T, Vimarlund V (2020) Nordic eHealth Benchmarking. -Towards evidence informed policies. Nordisk Ministerråd, Copenhagen 2020. TemaNord, 2020:505. https://doi.org/10.6027/temanord2020-505 (accessed 15.11.2022).

Oderkirk, J. (2017), "Readiness of electronic health record systems to contribute to national health information and research", OECD Health Working Papers, No. 99, OECD Publishing, Paris. Available at https://doi.org/10.1787/9e296bf3-en (accessed 14.11.2022).

Oderkirk, J. (2021), "Survey results: National health data infrastructure and governance", OECD Health Working Papers, No. 127, OECD Publishing, Paris. Available at https://doi.org/10.1787/55d24b5d-en (accessed 14.11.2022).

Ohtonen J (editor) (2012) Satakunnan Makropilotti: Tulosten arviointi. FinOHTAn raportti 21/2002. STAKES/FinOHTA, Helsinki, 2002. (in Finnish).

Omaolo.fi (2022) A website. Available at: https://www.omaolo.fi/ (accessed 14.11.2022).

Regional State Administrative Agencies (2022) Available at: h https://avi.fi/en/regional-state-administrative-agencies/ (accessed 22.4.2022).

Reponen J, Winblad I, Hämäläinen P (2008) Current status of national eHealth and telemedicine development in Finland. In: Blobel B, Pharow P, Nerlich M (eds). eHealth: Combining Health Telematics, Telemedicine, Biomedical Engineering and Bioinformatics to the Edge - Global Experts Summit Textbook. Studies in Health Technology and Informatics, Volume 134, pp. 199 - 208, 2008, IOS Press.

Reponen J, Winblad I, Hämäläinen P (2009) Status of eHealth Deployment and National Laws in Finland. Finnish Journal of eHealth and eWelfare 2009 1(1), 54-58.

Reponen J, Tuomiranta M, Erkkilä E (2013) Terveydenhuollon tietotekniikasta erityispätevyysohjelma [Special competence for healthcare information technology, in Finnish only]. Finnish Medical Journal 68:1031-1033.

Reponen J, Kangas M, Hämäläinen P, Keränen N (2015). Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2014 – Tilanne ja kehityksen suunta. THL Raportti 12/2015.

Reponen J (2017) Finnish special competence for healthcare information technology to physicians and dentists: aims, contents and initial experiences. Finnish Journal of EHealth and EWelfare, 9(1), 42-45. https://doi.org/10.23996/fjhw.61134. (accessed 15.11.2022).

Reponen J, Kangas M, Hämäläinen P, Keränen N, Haverinen J (2018) Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2017 – Tilanne ja kehityksen suunta. THL Raportti 5/2018.

Reponen J (2019) MEDigi project will utilize digitalization to improve the education of medical and dental students. Proceedings of eHealth2019, the 24th Finnish National Conference on Telemedicine and eHealth, pp 49 Kuopio 2019. https://www.telemedicine.fi/images/pdf/julkaisut/978-952-68112-9-1.pdf (accessed 08.11.2022).

Reponen J, Keränen N, Ruotanen R, Tuovinen T, Haverinen J, Kangas M, (2021) Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2020 – Tilanne ja kehityksen suunta. THL Raportti 11/2021.

Rötsä M, Berglind H, Huovila M, Hyppönen K, Peksiev T, Mykkänen J (2016) Sosiaalihuollon valtakunnallisten tietojärjestelmäpalvelujen ja määrämuotoisen kirjaamisen toimeenpanohanke (Kansa-hanke): Hankesuunnitelma vuosille 2016-2020. THL raportteja 10/2016. Available at http://urn.fi/URN:ISBN:978-952-302-660-5 (accessed 21.04.2022).

Sahala H (2005) Tietoteknologian käytön edistäminen sosiaalihuollossa - hankesuunnitelma. [Abstract in English]. [Project plan for promoting the use of information technology in social services. Stencils of the Ministry of Social Affairs and Health 2005:1] Sosiaali- ja terveysministeriön monisteita 2005:1.

Sahala H, Lehmuskoski A, Laaksonen M, Kärki J, Ailio E, Mykkänen J (2011) Sosiaalialantietoteknologiahanke – Hankesuunnitelman 2008–2011 toteutuminen. Tikesos-hanke.

Salovaara S, Silén M, Vehko T, Kyytsönen M, Hautala S (2021) Use of information and communication technology in social welfare services in 2020. Finnish Institute for Health and Welfare (THL). Report 10/2021. Helsinki, Finland.

Savonia (2022) Savonia University of Applied Sciences. Digital Health, Master of Health Care, online studies. A website. Available at: https://www.savonia.fi/en/study-with-us/degree-studies/masters-in-english/digital-health/ (accessed 21.10.2022).

Social Insurance Institution of Finland (Kela) (2018) Website, https://www.kela.fi/web/en/about-kela (accessed 21.04.2022).

Social Insurance Institution of Finland (Kela) (2022) Kanta architecture and timeline of Finnish Healthcare ICT Standardization for Interoperability. Available at: https://www.kanta.fi/documents/20143/106828/Kanta-arkkitehtuuri+ja+terveydenhuollon+yhteentoimivuuden+ja+IT-standardoinnin+aikajana+EN.pdf/6d93272e-b29b-1f86-423d-796ab8ee5e45 (accessed 21.04.2022).

Statistics Finland (2021) Finland in figures 2021. https://tilastokeskus.fi/tup/suoluk/index_en.html (accessed 15.11.2022).

Healthvillage.fi 2022. https://www.terveyskyla.fi/en (accessed 20.4.2022).

The Norwegian Directorate of eHealth. Comparative analysis 2021: National Health Portals in the Nordics [Internet]. The Norwegian Directorate of eHealth; 2021.https://web.archive.org/web/20211123052124/https://www.ehelse.no/strategi/nasjonal-e-helsemonitor/_/attachment/download/4c8517d6-203e-494a-978d-b4f6442343ad:078e05c60bf0e94d9e4cb02fba7a4317dd68e8a4/2021%20Nordic%20National%20Health%20Portals.pdf (accessed 20.8.2022).

THL, The National Institute for Health and Welfare (2018a) Terveys- ja sosiaalipalvelujen henkilöstö 2014, Tilastoraportti SVT: 2017_029. (in Finnish only).http://urn.fi/URN:NBN:fi-fe201801252227. (accessed 15.11.2022).

THL, The National Institute for Health and Welfare (2018b): Kotihoito ja sosiaalihuollon laitos- ja asumispalvelut 2017. Statistical Report 41/2018 (in Finnish only).http://urn.fi/URN:NBN:fi-fe2018121450858. (accessed 15.11.2022).

THL, The National Institute for Health and Welfare (2021) Health Expenditure and Financing 2019. Available at: https://thl.fi/en/web/thlfi-en/statistics-and-data/statistics-by-topic/social-and-health-care-resources/healthexpenditure-and-financing (accessed 20.4.2022).

THL, The National Institute for Health and Welfare (2022a) Social protection expenditure and financing 2019. Available at: https://thl.fi/en/web/thlfi-en/statistics-and-data/statistics-by-topic/social-and-health-care-resources/social-protection-expenditure-and-financing (accessed 20.4.2022).

THL, The National Institute for Health and Welfare (2022b) Terveys- ja sosiaalipalvelujen henkilöstö 2018.[in Finnish only] Available at: https://thl.fi/fi/tilastot-ja-data/tilastot-aiheittain/sosiaali-ja-terveydenhuollon-resurssit/terveys-ja-sosiaalipalvelujen-henkilosto (accessed 20.4.2022).

THL, The National Institute for Health and Welfare (2022c) Sosiaali- ja terveydenhuollon tietojärjestelmä-palveluiden seuranta ja arviointi (STePS 3.0) [Monitoring and assessment of social welfare and health care information system services (STePS 3.0), in Finnish only] Available at: https://thl.fi/fi/tutkimus-ja-kehittaminen/tutkimukset-ja-hankkeet/sosiaali-ja-terveydenhuollon-tietojarjestelmapalveluiden-seuranta-ja-arviointi-steps-3.0- Accessed 19.9.2022).

University of Eastern Finland (2022a) Department of Health and Social Management. https://www.uef.fi/en/unit/department-of-health-and-social-management (accessed 19.9.2022).

University of Eastern Finland (2022b) Sosiaali- ja terveydenhuollon tietohallinnon maisteriohjelma [in Finnish] Available at https://www.uef.fi/fi/koulutus/sosiaali-ja-terveydenhuollon-tiedonhal-linnan-maisteriohjelma (accessed 15.11.2022).

University of Oulu (2022a) Research Unit of Medical Imaging, Physics and Technology. https://www.oulu.fi/en/university/faculties-and-units/faculty-medicine/medical-imaging-phys-ics-and-technology (accessed 19.9.2022).

University of Oulu (2022b) DigiHealth Knowledge Hub. https://www.oulu.fi/en/projects/digihealth-knowledge-hub (accessed 19.9.2022).

University of Oulu (2022c) Centre for Health and Technology. https://www.oulu.fi/en/univer-sity/faculties-and-units/faculty-medicine/centre-health-and-technology (accessed 19.9.2022).

University of Oulu (2022d) Basics in eHealth Available at https://www.oulu.fi/en/joy/education-search/basics-ehealth (accessed 15.11.2022).

University of Oulu (2022e) Connected health and mHealth Available at https://www.oulu.fi/en/joy/education-search/connected-health-and-mhealth (accessed 15.11.2022).

Tampere University (2022a) Tampere University: Faculty of Medicine and Health Technology. https://www.tuni.fi/en/about-us/faculty-medicine-and-health-technology (accessed 19.9.2022).

Tampere University (2022b) BioMediTech. https://researchportal.tuni.fi/fi/organisations/biomed-itech (accessed 19.9.2022).

Tuovinen T, Reponen J, Isoviita VM, Koskela 5, Levy A, Pääkkönen J, Ravaja N, Saari T, Taina M, Veikkolainen P, Värri A, Kulmala P. (2021)Sähköisten terveyspalveluiden opetus lääketieteessä [Education of eHealth in Medicine, In Finnish only] Duodecim, 137: 1807-1813. https://www.duodecimlehti.fi/duo16387

University of Turku (2022) Research at the Information Systems Science. Available at https://www.utu.fi/en/university/turku-school-of-economics/information-systems-science/re-search (accessed 15.11.2022

Veikkolainen P, Tuovinen T, Jarva E, Tuomikoski AM, Männistö M, Pääkkönen J, Pihlajasalo T, Reponen J. (2022) eHealth Competence Building for Future Doctors and Nurses – Attitudes and Capabilities. International Journal of Medical Informatics, 169:104912. https://doi.org/10.1016/j.ijmedinf.2022.104912 (accessed 15.11.2022).

Winblad I, Reponen J, Hämäläinen P, Kangas M (2008) Informaatio- ja kommunikaatioteknologian käyttö Suomen terveydenhuollossa vuonna 2007 Tilanne ja kehityksen suunta. Raportteja 37/2008, Stakes, Helsinki 2008. (Abstract in English).

Winblad I, Reponen J, Hämäläinen P (2012) Tieto- ja viestintäteknologian käyttö terveydenhuol-lossa vuonna 2011. Tilanne ja kehityksen suunta. Raportti 3/2012. Terveyden ja hyvinvoinnin laitos THL. Tampere.

Värri A, Kinnunen UM, Pöyry-Lassila, P, Ahonen, O (2019) The national SotePeda 24/7 project develops future professional competencies for the digital health and social care sector in Finland. Finnish Journal of EHealth and EWelfare, 11(3), 232–235. https://doi.org/10.23996/fjhw.77605

Legislation

The Constitution of Finland 731/1999
Act on Primary Health care 66/1972
Act on Specialized Medical Care (1062/1989)
Act on Personal Data (523/1999)
Act on Experiments with Seamless Service Chains in Social Welfare and Health Care Services and with a Social Security Card (811/2000)
Act on Social Insurance Institution 731/2001
Act on Occupational Health Care 1383/2001
Act on Social Welfare 1301/2014
Act on Sickness Insurance 1224/2004

Act on Child Welfare 417/2007

Act on the Electronic Processing of Client Data in Social and Health Care 159/2007

Act on Electronic Prescriptions 61/2007

Act on Health Care 1326/2010

Act on Information Management Governance in Public Administration 634/2011

Act on Supporting the Functional Capacity of the Older Population and on Social and Health Services for Older Persons 980/2012.

Act on changes in the legislation on the Electronic Processing of Client Data in Social and Health Care (250/2014)

Act on Social Care Client Documentation (254/2015)

Act on changes in the legislation on the Electronic Processing of Client Data in Social and Health Care (255/2015)

Act on Electronic Client Data Processing in Social Welfare and Healthcare (784/2021)

Ministerial Act 298/2009. Act on patient record documentation. Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (in Finnish). Asetus potilasasiakirjojen laatimisesta sekä niiden ja muun hoitoon liittyvän materiaalin säilyttämisestä

Ministerial Act 11.4. 2012/165. Ministerial Act, Ministry of Social Affairs and Health, on timing of the implementation of the eArchive. Sosiaali- ja terveysministeriön asetus terveydenhuollon valtakunnallisista tietojärjestelmäpalveluista

Ministerial Act 13.10. 2015/1257. Ministerial Act, Ministry of Social Affairs and Health, on timing of the implementation of the eArchive. Sosiaali- ja terveysministeriön asetus terveydenhuollon valtakunnallisista tietojärjestelmäpalveluista

Ministerial Act on social and health care client data electrical handling 300/2018

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 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 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 launching stage of the national health information exchange (HIE), the Kanta services (Social Insurance Institution of Finland 2022). In 2014 the survey time point was when Electronic Prescribing services had been nationally adopted in public healthcare and first institutions had started to use the Patient Data Repository (Reponen et al. 2015a, 2015b). During the 2017 survey (Reponen et al. 2018) 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. The current seventh survey in 2020 (Reponen et al 2021) was made when those services were in full use throughout the public healthcare and in most private organisations. The survey also describes the situation at the end of the eHealth and eSocial Strategy 2020 period (Ministry of Social Affairs and Health 2015).

Questions have been kept as comparable as possible to the previous surveys, but to follow the development of ICT in healthcare and to achieve compatibility with the indicators based on the OECD (OECD 2015) and the Nordic e-health Research Network (NeRN) (Hyppönen et al. 2013a, 2013b, 2015, 2017, Nøhr et al 2020) indicator development, some modifications were made to the recent survey.

Data collection and comparison to earlier surveys 2003–2017

This survey was conducted as described in the English language reports of previous national e-health surveys of Finland (Hämäläinen et al. 2007, 2009, 2013, Reponen et al. 2015b, 2019). A structured web-based questionnaire was distributed by e-mail to all public healthcare service provider organizations, which are municipal healthcare centres for primary healthcare and hospital districts for specialised secondary health care, and to a sample of private healthcare provider organizations.

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 2020 to all mainland public service providers, including 20 hospital districts and 136 healthcare centres. The questionnaire in Swedish was sent to the autonomous Swedish-speaking region of Åland in September 2020. The questionnaire 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 29 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 2017. All organisations were asked to give their answers based on the situation on 31st of January 2020.

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 (includes Åland) and healthcare centres n=130. 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 2021 (Reponen et al. 2021). Data for the years from 2005–2017 are based on previous reports (Kiviaho et al. 2004a, 2004b, Winblad et al. 2006, 2008, 2012, Reponen et al. 2015a, 2018) if not otherwise stated.

Response rates to the questionnaire in public healthcare were 100% (21) for hospital districts and 96% (130/136) for healthcare centres. The latter figure covers 99% 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 between 2011 and 2017. 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 43% (12/28). The size of the sample was not large, but nationally biggest private healthcare providers were included. Thus, the results concerning private service providers can only be regarded as indicative. However, they are moderately comparable with earlier results, since the biggest organisations responded to the survey also in 2014 and 2017.

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

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 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 in 1995 Ministry of Social Affairs and Health 1995). The strategic development since 2002 towards current nationally standardized data structures has been described in the chapter 1 of this publication.

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, 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. In 2020 there were seven different EPR trade names mentioned in public secondary healthcare (five in 2017) and seven different trade names in public primary healthcare (six in 2027). After the ongoing system renewals there were expected to appear six EPR trade names in public secondary care and five in public primary healthcare by 2021. In our sample of private care providers, three different EPR trade names were in use (six in 2017).

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 2020, the full 100% intensity of use of EPR was reported in 100% of hospital districts in the responsibility area of conservative care. The same full usage intensity was reported by 100% of the districts in operative, 100% in psychiatric, and 95% in emergency care. Compared to earlier studies, further progress in already high intensity has been made (Figure 4). Emergency care has had slightly less electronic-only information use than other areas. In 2020, it was the only area where any of the 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 organizations are involved in emergency medical service missions, and all organizations have their own ICT systems (Haverinen et al. 2018).
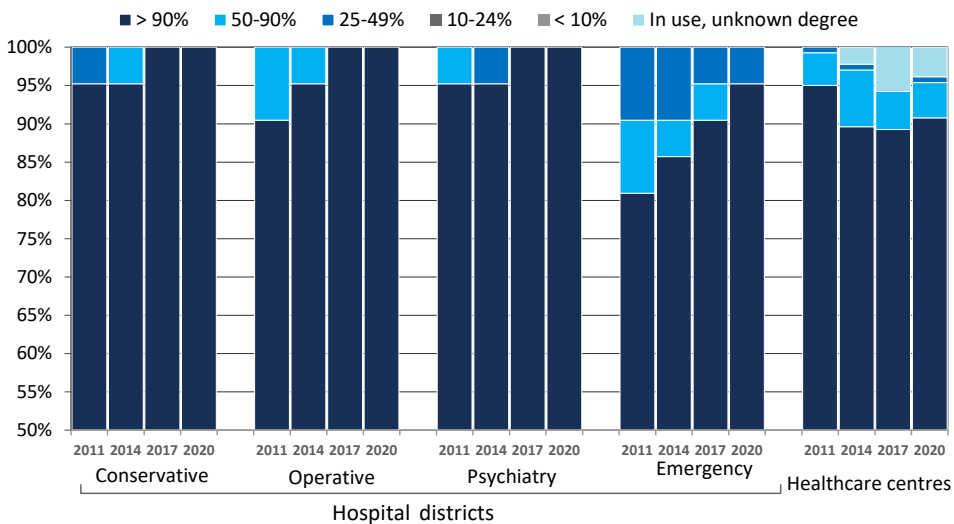

Figure 4. The distribution of public healthcare providers according to the intensity of EPR usage. Hospital districts shown separately for the responsibility areas of operative, conservative, psychiatric, and emergency care.

Due to the long history of electronic records, the intensity of use for electronic-only data has traditionally been high in *primary health care*, which means that in 2020 91% of the responding healthcare centres reported that over 90% of patient data was processed electronically (Figure 4). In the present survey sample of *private service providers*, 92% of those who answered to the question reported that the intensity of use for EPR data was over 90%. This was at the same level as in 2017.

Additional systems for medical specialties

Auxiliary patient record systems for various specialities and services in addition to the main EPR system were in use in all public specialized health care hospitals and the most common systems are presented in figure 5. In primary health care units, 84% of them reported such a system and the most common types were in rehabilitation equipment loans (74%), home care (44%), rehabilitation (43%) and maternity clinics (24%). When compared to the previous surveys (2014, 2017, 2020), use of these systems and the number of different products has increased in hospital districts (Keski-mäki et al. 2021).
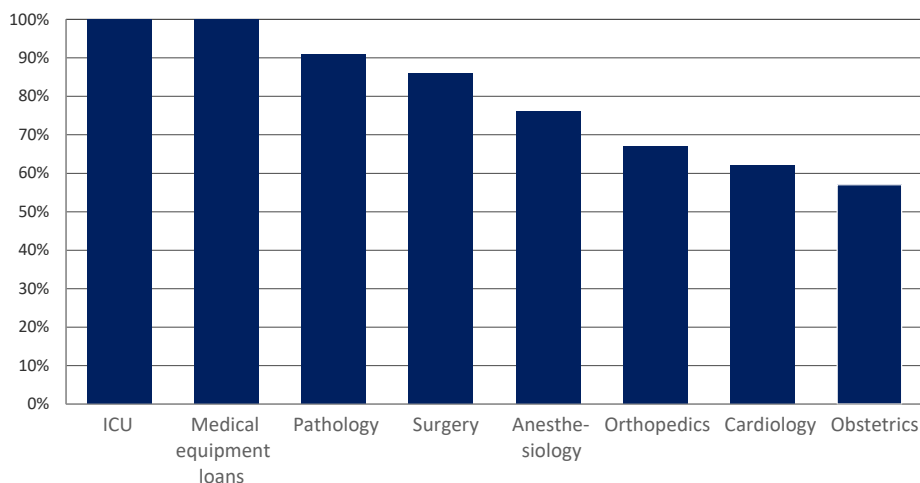
Figure 5. Most common auxiliary patient record systems for medical specialties and services in hospital districts in 2020. ICU=Intensive Care Unit

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 2020 86% of hospital districts reported 100% intensity of use. None of the hospital districts reported any film imaging in the 2014 survey and afterwards. PACS archives are used to store also other than radiological images. There are seven different trade names in the Finnish hospital PACS market.

PACS was available in 98% of the *primary healthcare centres* (Figure 6). The saturation point of PACS availability has been clearly reached, as already in 2014 and 2017 only maximum of two healthcare centres reported that they did not have PACS. Most of the healthcare centres (94%) utilised a common regional PACS with the hospital district or with a regional enterprise. The availability of a regional PACS was at the same level compared to 2017 (87%), and the intensity of use for PACS has been at the high level since 2014, now in 2020 74% of the healthcare centres reported over 90% usage rate. Conventional film was not used anymore, expects for dental x-rays in one primary health centre.

In the sample of *private service providers*, 9 out of 12 mentioned that they had PACS available. Full 100% intensity of use for PACS was reported by 6 private service providers. Four 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.

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 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 their second-generation RIS in order to achieve seamless integration with EPR and regional services. There were five RIS trade names in the Finnish specialised care market in 2020.

Among *healthcare centres* 97% of those that answered the survey reported that they had a RIS in use, while the figure was 98% in 2017 (Figure 6). The results show that most of the healthcare centres now used the RIS of their hospital districts or other regional service provider (88% of the users).

In *private health care* sample, 50% of the respondents reported they had a RIS available. In practice, majority of private organisations using PACS probably used RIS functionalities embedded in their systems, since it is a prerequisite for electronic archiving.
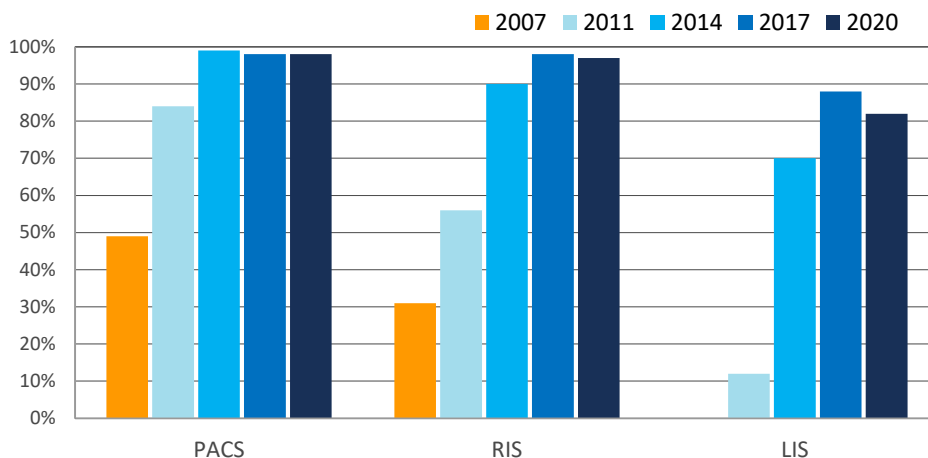

Figure 6. Availability of PACS, RIS and LIS in Finnish public primary healthcare centres.

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. There were four different trade names for a LIS in the hospital sector. In a few hospital districts, either the brand or user interface of the LIS system had changed since 2017. In the majority of hospital districts, the LIS and user interface came from the same supplier, but some respondents have an integrated interface to the patient record and a different supplier than the laboratory production control system. Browser interfaces are common.

In *primary healthcare centres*, the LIS system was reported to be used by 82% of the responding health center organizations (n = 130), compared to 88% in 2017 (Figure 6). However, only 3% indicated that LIS would not be in place. For the remaining 15%, the question had not been answered. The system was owned by 16% of the users

of the health center, 30% of the users in the hospital district, and 33% of the users in the regional laboratory establishments. Two percent of respondents had a LIS from a private operator from whom laboratory services were procured.

Digital ECG

Digital electrocardiogram (ECG) is likely the most important biosignal data used in everyday medical practice. In 2020 100% of the hospital districts, 90% of the healthcare centres, and 67 % of our sample of private service providers had digital ECG in use. The extent of the use of electronic ECG in public health care organizations has remained the same compared to 2017. The proportion of DICOM-compliant recording has increased in public health care organizations and is the most common single form of recording in both hospital districts and primary healthcare centers. There has been a considerable increase in these figures since 2014, and a shift from proprietary or image formats to DICOM ECG (Table 2). 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 2020, the telemetry reception of the ECG from the ambulance transport units was reported by 86% of the hospital districts.

Table 2. The availability of digital ECG and its data formats in hospital districts, healthcare centres and the private sector in 2011, 2014, 2017 and 2020.

| | | Digital ECG in use (%) | % of users use this standard | | |
			DICOM	Another or manufacturer's standard	PDF format
Hospital districts	2020	100	76	14	10
	2017	100	67	24	24
	2014	86	50	67	17
	2011	57	25	67	17
Healthcare centres	2020	90	42	18	12
	2017	90	44	20	21
	2014	77	38	45	10
	2011	62	26	68	15
Private service pro-viders*	2020	57	17	33	50
	2017	42	8	4	31
	2014	36	8	8	24
	2011	20	7	7	13
*a lot of missing data					

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 2020 a total of 95% of the hospital districts had extended wireless EPR access outside of the hospital e.g. for doctors on call (91% in 2017). Simultaneously, all the hospital districts provided wireless access to medical imaging outside the hospital (91% in 2017). In 2020 the patient information contained in the EPR was available to the emergency medical service units in 62% of hospital districts (57% in 2017). In 88% of the *primary healthcare centres* (74% in 2017), wireless EPR usage was available also outside of the unit. In our sample of private service providers, seven out of 12 had wireless use of the EPR outside the institution.

The availability of *mobile terminal devices* has not increased compared to 2017. 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 2020, only 43% provided a tablet computer and only 14% used them for EPR access. In healthcare centres 18% were providing a tablet computer for physicians (21% in 2017) and EPR access was possible in 25%. Remote access to the EPR via a smartphone was reported in four hospital districts (19%), eight healthcare centres (6%) and in one private service provider.

A *speech recognition system for digitally dictated doctor's notes* was in use in 81% of the hospital districts and in 32% of the healthcare centres. This has remained the same compared to 2017. In our sample of private service providers, five of them (42%) reported a speech recognition system. 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.

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 2020 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 or EBMeDS),

2) Drug interaction systems (e.g. the Finnish system SFINX (Swedish-Finnish-Interaction-X-referencing)/INXBASE), 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 in 2017–2020 surveys, and fully integrated systems are in more common use among public healthcare service providers. Availability of drug interaction support and diagnostic support has reached 100% for the hospitals (Figures 7 and 8).
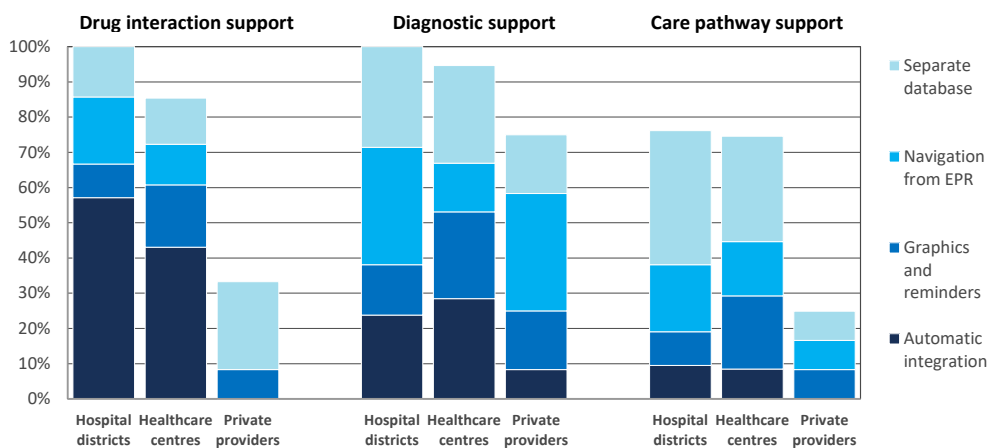
Figure 7. Prevalence and integration of different decision support systems in Finnish healthcare in 2020.
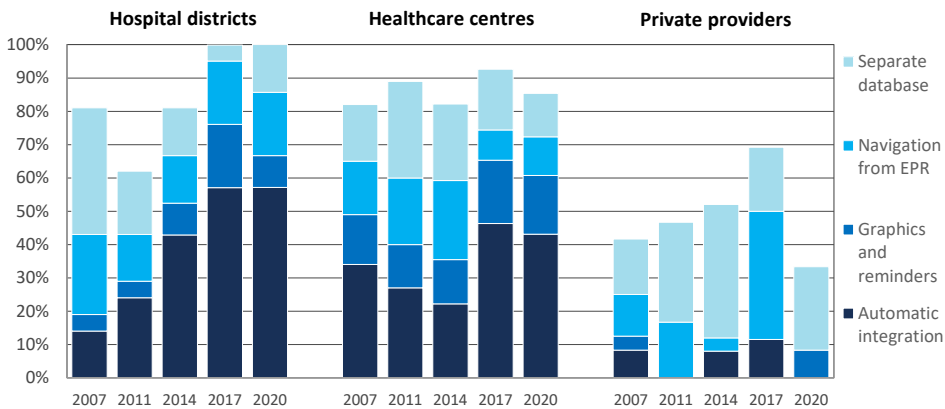
Figure 8. History of drug interaction support systems in Finnish healthcare.

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 organization 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. For this chapter 2 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 tight integration to work processes and also because of their better presentation of some data types, e.g. medical images.

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 2020 *available* in all of the 21 *hospital districts*, while the number was 100% in 2017, 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 2020. The availability has saturated since 2017. (Figure 9).

Six *private service providers* received electronic referrals from public healthcare centres and six of those also from hospitals. Six private service providers sent electronic referrals inside own organisation, seven to other private care providers and seven sent them to public secondary care (hospital districts). There is a light increase in this functionality compared with 2017.
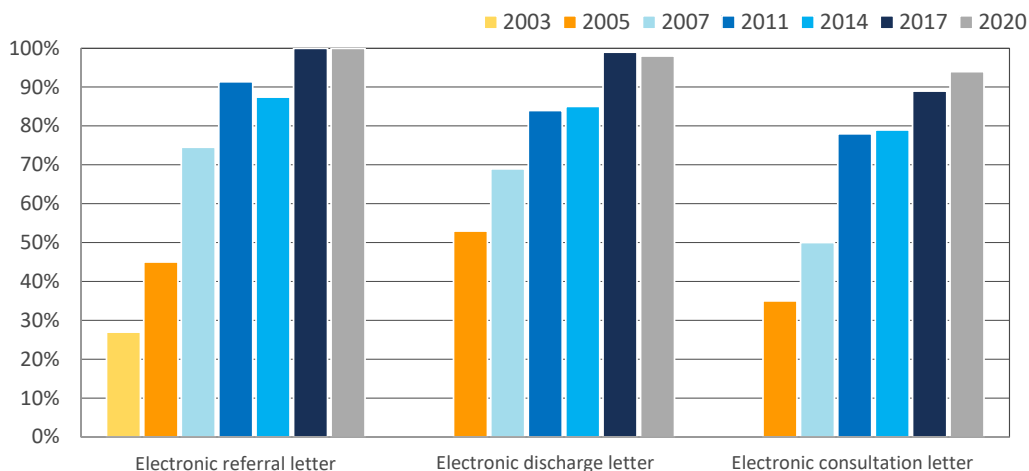
Figure 9. The distribution of healthcare centres having electronic referral letters, electronic discharge letters and electronic consultation letters available in 2003–2020.

The *intensity of use* of the electronic referral service in hospital districts has remained at a high level since 2011 (Figure 10). In 2020, over 88% 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 79% in psychiatry.
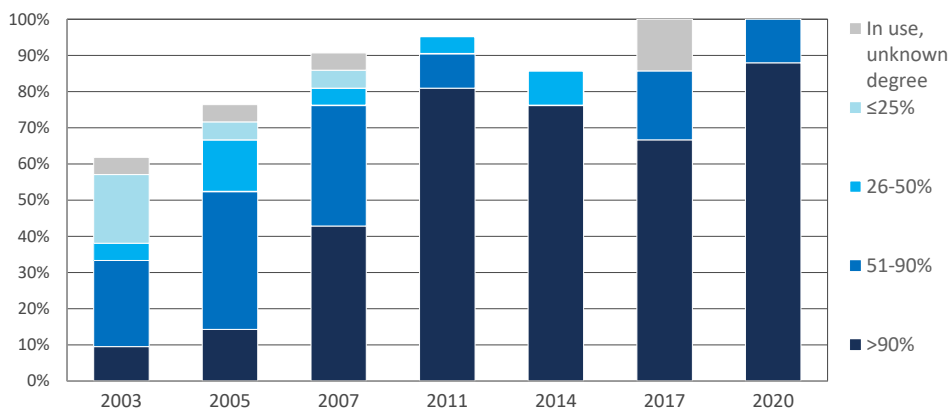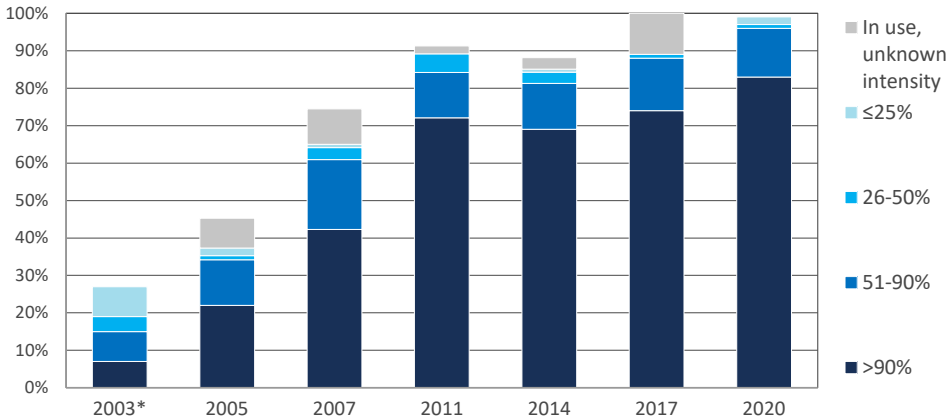

Figure 10. The intensity of use of electronic referral letters and discharge letters in the hospital districts in 2003–2020, somatic specialties.

The intensity of use of the electronic referral service in the public healthcare centres parallels the high figures of the hospital districts (Figure 11). There is a light increase since 2017.

Figur 11. The intensity of use of electronic referral letters in public primary healthcare centres in 2003–2020.

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 (95% in 2017) and 98% of the *healthcare centres* (99% in 2014) were capable of receiving them. The intensity of use for discharge letters was in 52% of the hospital districts over 90% and in 33% of the hospital districts it was between 50% and 90%, meaning there is major increase in use since 2017.

Six of the 12 *private healthcare service providers* in our sample sent and seven of them received electronic discharge letters with another healthcare organisation. The private sector was engaged in these activities slightly 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 57% of the hospital districts to primary care, the availability being higher than in 2017 (47%).

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* as already in 2017. Electronic consultation letters to specialised care were used by 94% of the *healthcare centres*. It has increased from previous survey in 2017 (89%). 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 slightly increased compared to previous years. (Figure 12). Three private service providers reported being able to receive electronic consultations from public primary healthcare.
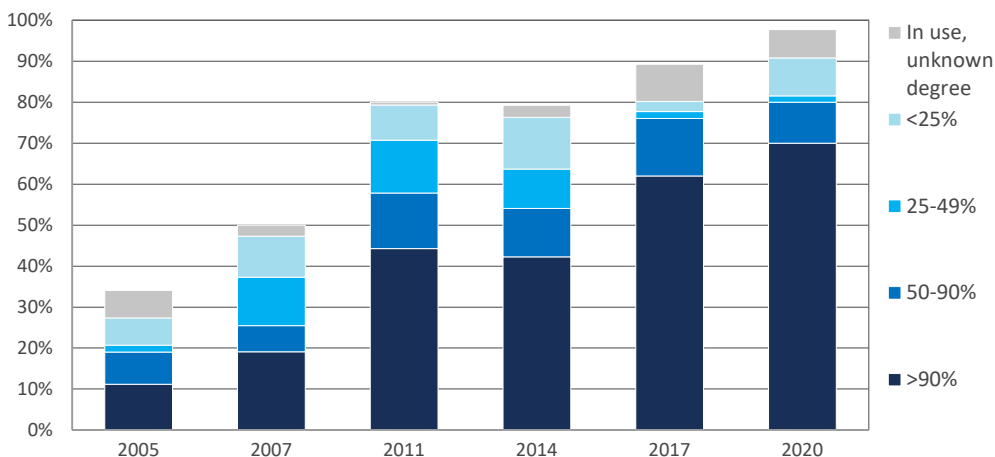

Figure 12. The intensity of use of electronic consultation letters in public primary healthcare centres in 2005–2020.

The proportion of hospital districts using *teleconsultations via videoconferencing* was 76% in 2020, while it was 86% in 2017. In general, availability seems to have increased rather slowly. A total of 42% of healthcare centres used video consultations and this availability has increased slightly from the previous surveys (39% in 2017). However, the intensity of use was still low since 32% of the respondents had used videoconferencing during the last three months before the survey date. Most often the video consultations were used in psychiatry, in skin diseases and in neurology (e.g. clinical appointments or telestroke service). Similarly, during the period of the present

survey, five of 12 *private healthcare service providers* used above mentioned teleconsultation services via videoconferencing.

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 has not replaced RHIE systems in public health care. The maturity of different hospital districts to provide regional e-health services has been discussed in a separate article (Haverinen et al. 2022).

According to year 2020 survey, all the 21 *hospital districts* have a specific regional patient data repository in clinical use, there is increase comparing previous studies (90% in 2017, 90% in 2014, 86% in 2011 and 81% in 2007). The main development took place after 2005, when the figure was only 42%.

An 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 organizations 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 19% 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 71% 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.

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), 100% 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) as well as 95% of the hospital districts are capable of distributing laboratory results. The decline in the exchange of information on laboratory results is explained by the fact that one hospital district did not report this information in 2020. This high level of regional health information exchange services was achieved by the time of the in 2011 survey and has even improved for text exchange. The development between the years 2003 – 2020 is shown in Figure 13.
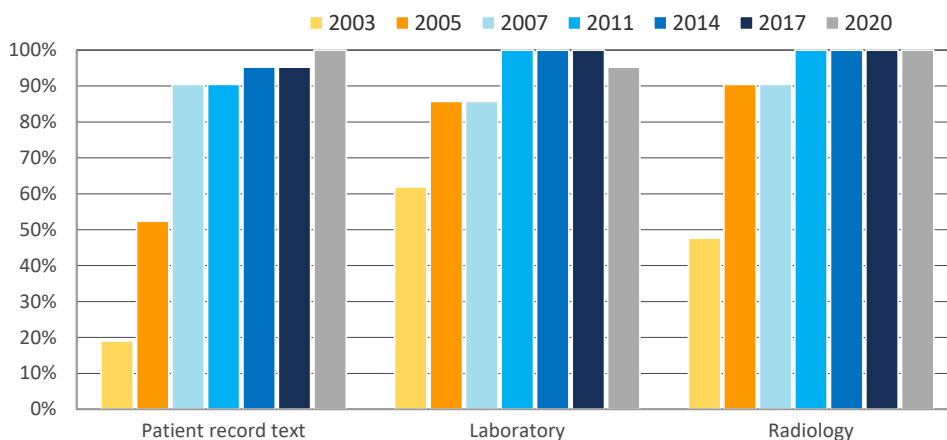
Figure 13. Regional electronic exchange of patient information in hospital districts with by any means other than the national registry in 2003–2020.

Another implementation of RHIE is a large area data repository that serves for many individual hospital districts within the responsibility area of each of the five university hospitals in Finland. In 2020 24% of the hospital districts have joined this type of geographically larger repository for their text data, 10% for laboratory services, 10% for their imaging services, and 19% for the exchange of digital ECG. Some organizations have plans to join one in the near future (5% for imaging data and 5% for laboratory data). Anyhow, the importance of these large area repositories remains low due health and social services reform and these numbers are already lower than in the 2017 survey.

In *public primary care*, a total of 97% 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 93% and laboratory results by 83% of the healthcare centres. There has been a steady increase between the year 2003 and 2017, as seen in Figure 14. Since then, no major increase can be seen.
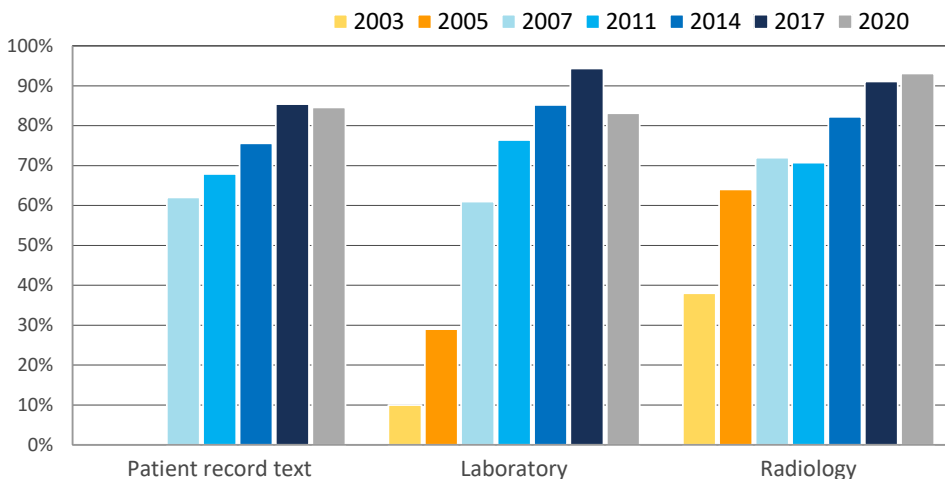
Figure 14. Regional electronic exchange of patient information in public primary healthcare centres by any means other than the national registry, in 2003–2020.

Among *private service providers*, in our sample of 12 respondents, exchange of EPR text was used by three, laboratory results by two, medical images by five and imaging reports by five 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. 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.

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 and real implementation started at the beginning of the 1990s. In 1994, all five university hospitals had teleradiology services.

(Reponen and Niinimäki 2006). Regular service started in the sparsely populated northern areas but has since then spread all around the country (Reponen 2008, 2010). Teleradiology includes either radiological teleconsultation or 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. If a healthcare centre needs the images made in the hospital for comparison purposes, those can be viewed on-demand from the regional archive/repository.

In our series of surveys, 100% of the *hospital districts* have been providing teleradiology services within their responsibility areas since 2011. Those *healthcare centres* that have a connection to the regional imaging service can utilize the services (94% in 2020). With the current infrastructure, teleradiology is a matter of service agreements between the partners. Our survey did not reveal how many service contracts nowadays exist between public healthcare units and *private service providers*.

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 exchange between social and healthcare has decreased since year 2017. In 29% of the *hospital districts* (33% in 2017, 10% in 2014) it was possible to access client information that existed in a social care organisation with the permission of the client, while 62% (62% in 2017, 29% in 2014) allowed social care organisations to have access to healthcare information in hospital districts.

At the *healthcare centre* level, 30% (38% in 2017) had access to read social care information with the permission of the client and 46% (54% in 2017) allowed social care organisations to have access to the healthcare information of the client. This is a decrease compared to earlier results.

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 86% of hospital districts and 63% of healthcare centres. (Table 3) Because CDA R2 is in use in Kanta and DICOM in local and regional PACS, the announcements given by healthcare centres are lower than in reality. The answers also reflect how well the respondents know the standards.

In the sample of 12 private service providers, all 12 respondents announced that they were using at least one of the standards mentioned. The most often named was DICOM (n=6), followed by HL7 CDA R2 (n=6), HL7 CDA R1 (n=2), and XML messages (n=7). There has been some increase in the use of named standards compared to 2017, especially in XML messages and HL7 CDA R2.

Table 3. The most often used standards for data exchange between organisations in public healthcare in 2005–2020 as a share of healthcare units.

		%				
		OVT/EDI	HL7 CDA-R1	HL7 CDA-R2*	XML-message	DICOM*
Hospital districts	2020	43	48	100	86	100
	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	2020	21	28	39	63	62
	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, therefore the real usage in healthcare centres is higher						

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. A comprehensive discussion about Finnish e-health services intended for citizens is available in a separate article (Ruotanen et al. 2021).

Availability of information

All organizations 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 15.
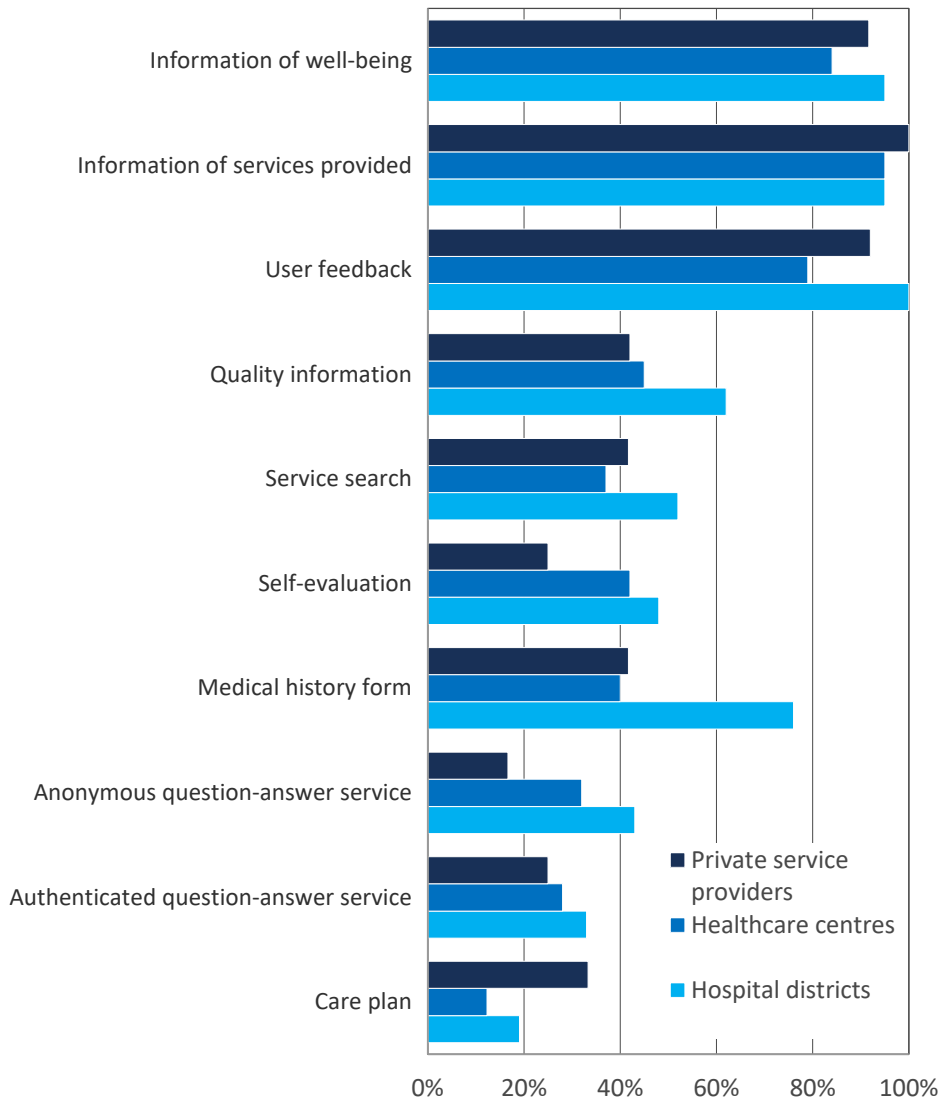

Figure 15. Services offered from an organization's web pages.

Information on services and locations was available on nearly all websites already in 2014 and 2017, now the same high prevalence exists for information of wellbeing and online user feedback. Availability of quality information and online medical history form services has increased compared to 2017. Other functionalities accessed through the webpages or otherwise are discussed below.
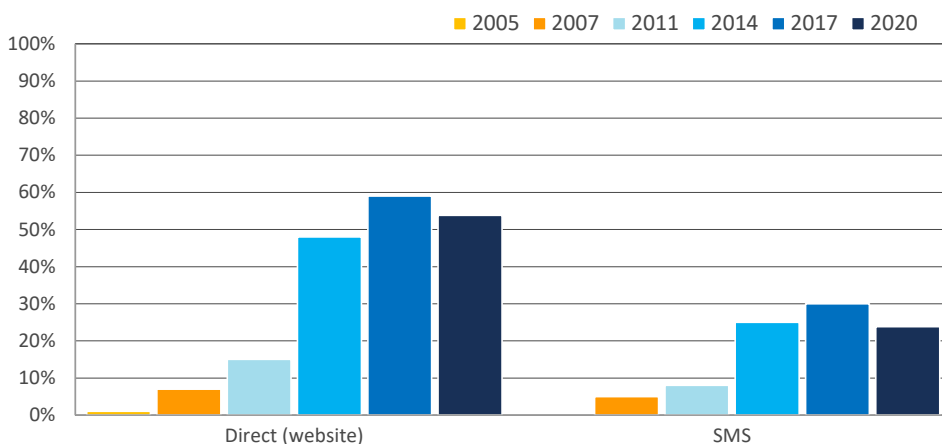
Electronic appointment booking services

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 2020, the availability of direct online appointment booking through webpages has remained stable. It was in use in 95% of *hospital districts* and 54% 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 16 and 17). In our sample of 12 *private service providers* direct online appointment booking through webpages was available for 11 respondents.
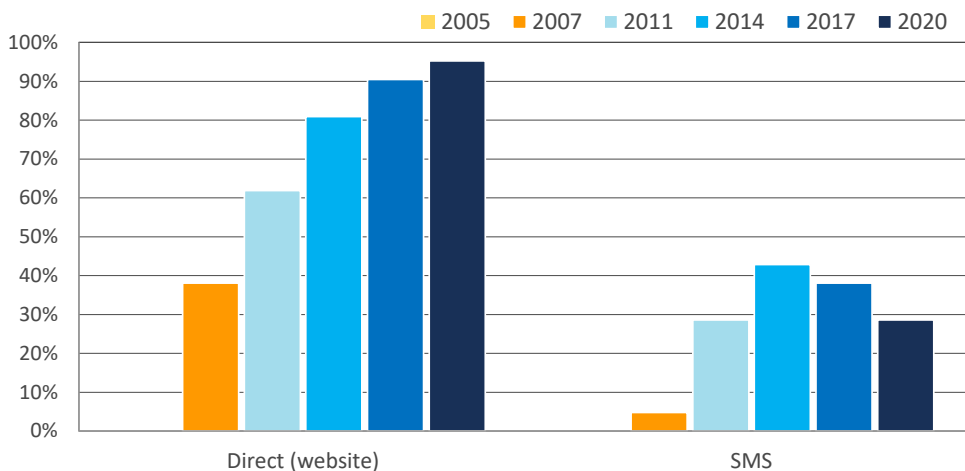
Figure 16. Electronic appointment booking services in hospital districts in 2005-2020. None of the hospital districts had these services in 2005.

Figure 17. Electronic appointment booking services in healthcare centres in 2005–2020.

Availability of short message service (SMS) appointments has dropped in *hospital districts* where the availability in 2020 was 29% and in *healthcare centres* with availability of 24% (Figures 16 and 17). In our sample of 12 *private service providers*, SMS appointment making, confirmation, or cancellation was available in 6 organisations.

Direct communication between patients and professionals

Question–answer services and contact methods
The availability of a *web-based anonymous question–answer service* had increased since 2017, being used in 43% of hospital districts, in 32% of the healthcare centres, and 6/12 of private service providers. A *web-based question–answer service with patient authentication* was available in 33% of the hospital districts, while 28% of healthcare centres and 5/26 of private service providers offered this service.

Information exchange between professionals and patients has continued to increase and change 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, 8% of primary care centres, and 2/12 private service providers; encrypted email in 57% of hospital districts, 48% of healthcare centres and 11/12 private providers. SMS communication was available in 52% of hospital districts, 48% of healthcare centres and 3/12 private service providers. The history of the availability of these forms of communication in primary healthcare is shown in Figure 18. Use of various types of apps for this kind of communication was asked for the first time. Healthcare-specific mobile communication apps were in use in 67% of hospital districts and 12% of healthcare centers, and 4/12 private service providers. Public apps

such as Whatsapp or Snapchat were used by 10% of hospital districts, 2% of healthcare centres, and 0/12 of private service providers.
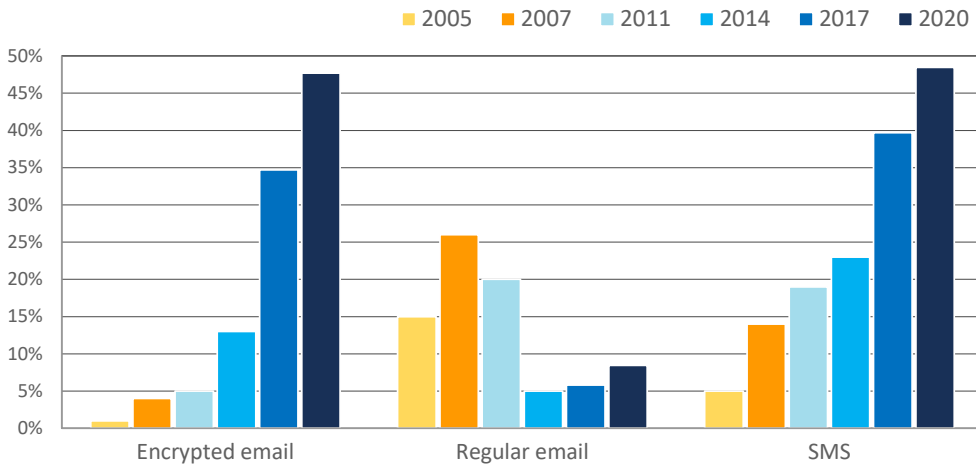
Figure 18. Electronic messaging between health professionals and patients in healthcare centres in 2005, 2007, 2011, 2014, 2017 and 2020.

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, organizations 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 4) has remained stable since 2014.

In principle all medication renewal requests done by patients should be done through electronic means, initiated by the pharmacy or the patient. 29% hospitals, 63% of primary healthcare centers and 7/12 private service providers still accepted other kinds of renewal requests, including phone calls from pharmacies and patients, or walk in requests.

Table 4. Citizen access to their own EPR information locally in healthcare organizations in 2020, divided by information type

	Any	Medications	Laboratory results	Diagnoses	EPR text
Hospital districts (%)	38	19	29	10	5
Primary healthcare centres (%)	21	13	17	8	5
Private service providers (n)	6/12	4/12	4/12	4/12	4/12

Personal health records and entering citizen recorded health information
Citizens are increasingly able to send measurements and test form information to professionals locally. Citizen initiated recording of measurements was now available in 71% of the hospital districts (33% in 2017), 34% of primary healthcare centres (19% in 2017), and 3/12 private service providers. Citizen initiated recording of text information was available in 52% of hospital districts (43% in 2017), 34% of primary healthcare centres (20% in 2017), and 4/12 private providers. These systems were used "often" in 14-43% of units. In 43% of hospital districts and 15% of healthcare units the data was automatically copied into the patient record as patient-produced-data, instead of staying in a PHR-like structure under patient management.

## Availability of human and material resources

Professional education and training

The availability of web-based training for personnel has been at the same level since 2014, and in 2020 it was available in 100% of central hospitals, in 98% of healthcare centres, and in 9/12 private service providers. Education was mainly regarding medication, software, privacy and data security, patient security, procedures, and radiation safety.
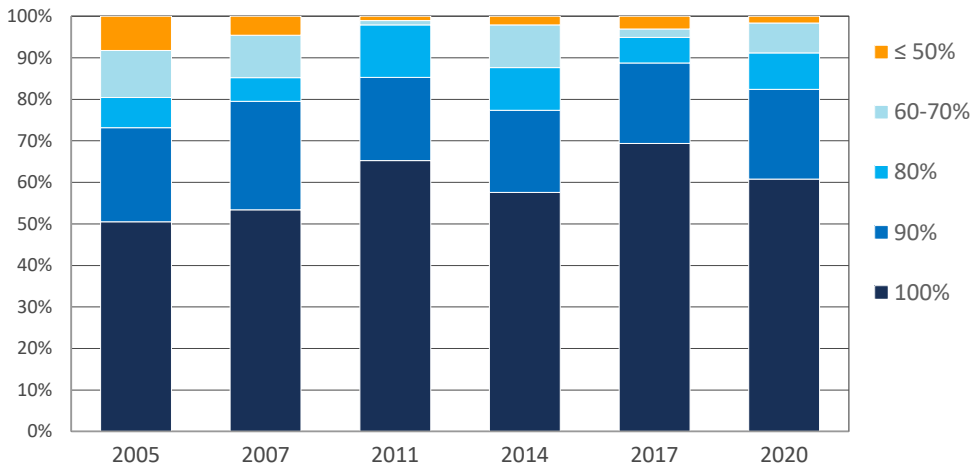
Computer skills of healthcare personnel

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 2020, over 76% of hospital districts and about 60% healthcare centres informed that all the personnel documenting and reading patient information had basic computer skills (Figures 19 and 20). In the majority (n = 8) of private service provider organizations, the share of computer-skilled personnel was 100%, in two 90%, and in one 80%.
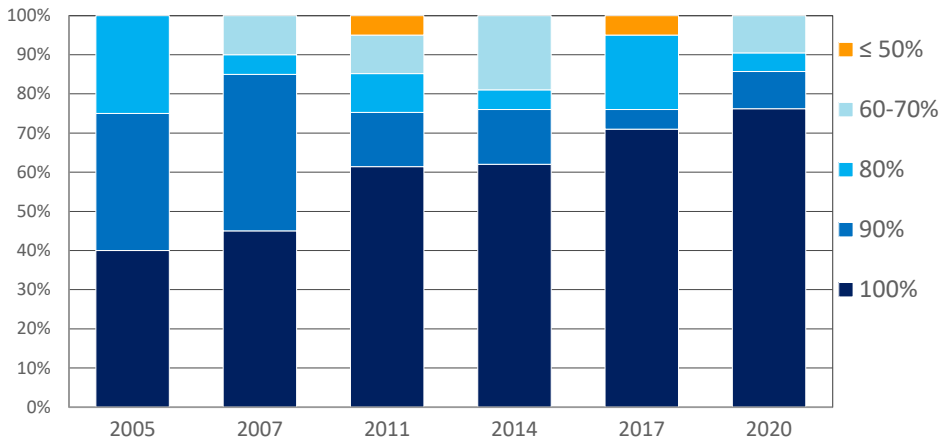
Figure 19. Distribution of hospital districts based on the proportion of personnel with basic ICT skills documenting and reading patient information. Scale modified from 10% interval menu (10–100%).

Figure 20. Distribution of healthcare centres based on the proportion of the personnel with basic ICT skills documenting and reading patient information. Scale modified from 10% interval menu (10–100%).

Privacy training was received comprehensively by the personnel in 66% and to some extent in rest of hospital districts. In 75% of healthcare centres personnel had received comprehensive privacy training, and the majority (94%) of personnel had received at least some privacy training. Among private sector samples, 10 organisations had provided comprehensive and two some privacy training.

Technical support availability for users of the patient record system

The availability of technical support in public organizations is higher in hospital districts than in primary healthcare centres (Figure 21). The situation has remained essentially unchanged since 2014.
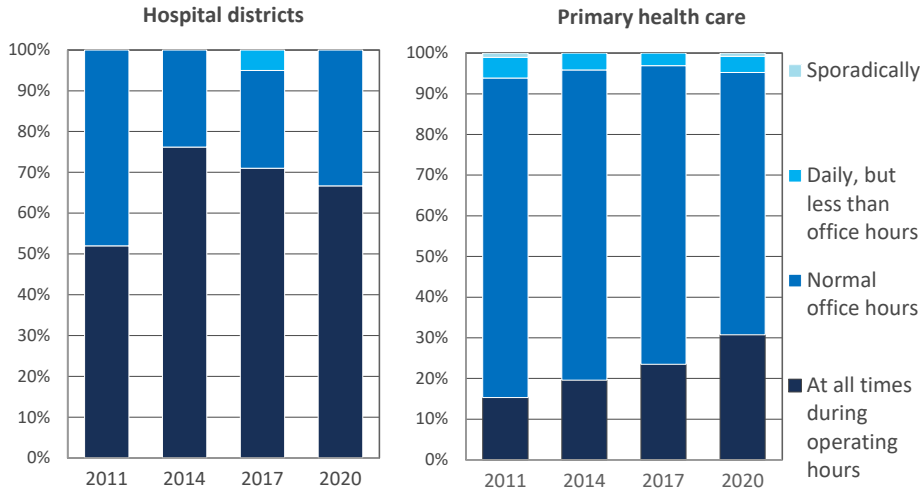

Figure 21. Technical support availability for the EPR in A) specialised healthcare and B) primary healthcare in 2011–2020.

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

In the questionnaire, organizations gave estimation on their annual costs (in EUR or as a percentage of total budget) in 2019 for purchasing, maintaining, and developing information and communication technology and for training. In the hospital districts the proportion of the ICT budget varied from 0.9% to 5.0% being evenly distributed as since 2013. (Figure 22) From 2005 to 2016 the median value of ICT costs has varied from 2% to 3%, now in 2019 being increased to 3.3%. The increase is in line with the fact that most of the hospital districts (86%) estimated their percentage of budget used for ICT systems in 2019 gone up compared to 2018.
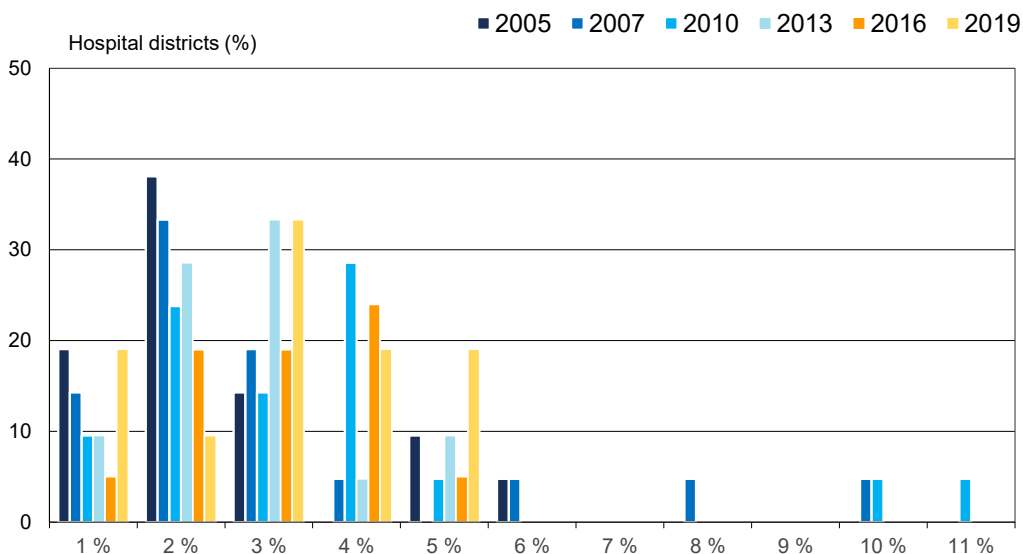
Figure 22. Distribution of hospital districts based on their estimations of the proportion of ICT-related costs in the annual budgets in 2005, 2007, 2010, 2013, 2016 and 2019. Costs are presented as the current prices at the time point of the survey.

In the healthcare centres the ICT-related annual costs had a median value of 1.7% in 2019 which is a little lower than in 2017 (2%). However, most (77%) of the organisations estimated that the percentage of their budget used for ICT systems in 2019 had gone up compared to 2018.

The situation was much the same with private service providers since 54% of those who answered the question, estimated that the percentage of their budget used for ICT systems in 2019 had increased compared to the previous year. However, he median value of ICT budget in 2019 was 2.25% being the same as in 2016. The ICT costs as a percentage of the budget remains at the same level as in other Nordic countries (Jerlvall and Pehrsson 2018).

Hospital districts' ICT-related costs in 2007, 2010, 2013, 2016 and 2019 are presented as EUR per capita in Figure 23. 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 48 in 2016 to EUR 72 in 2019 (Figure 23).

€ per capita

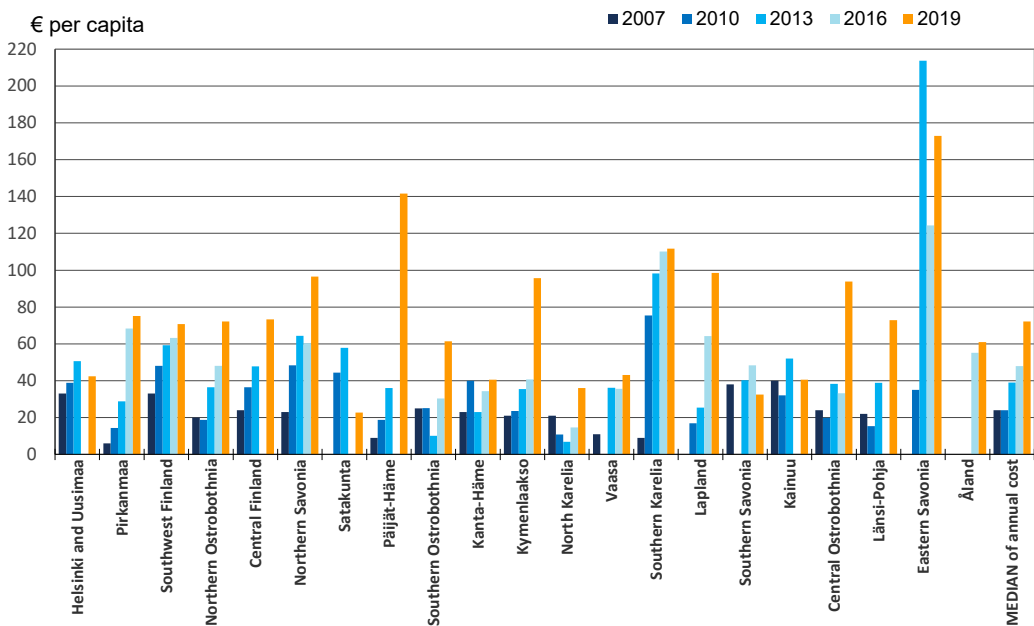Legend: ■ 2007 ■ 2010 ■ 2013 ■ 2016 ■ 2019

Figure 23. Annual ICT related costs (€) per capita in the 20 hospital districts in 2007, 2010, 2013, 2016 and 2019. Costs are presented as the current prices at the time point of the survey. Some minor changes have occurred in the geographical coverage of the hospital districts.

Highest annual ICT costs per capita in 2019 was in the East Savonia which has been the case also in 2016 and 2013 (Figure 23). East Savonia hospital district has merged primary, secondary and social care into one organisation since 2016. It was in 2013 the first organization to connect to the Patient Data Repository in the national Kanta services and was also participating in the testing of the national procedure. The East 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 Finland (THL 2022)

The second highest ICT cost per capita in 2019 was in in Päijät-Häme, which did not report the ICT costs for 2016 in the previous survey. The hospital district has also merged primary, secondary, and social care into one organisation since 2017. The third highest ICT costs per capita in 2019 was in South Karelia hospital districts (Figure 23) which had the second highest values in 2016 and 2014 surveys. The costs were quite equal between 2016 and 2019. 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.

Kymenlaakso and Central Ostrobothnia hospital districts have high increase in ICT costs per capita from 2016 to 2019. In Kymenlaakso is one of those hospital districts that have been merged primary, secondary and social care into one organisation since 2016 survey. Central Ostrobothnia had such an arrangement already in 2016.

Availability of Management and Data safeguarding systems in health care

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. All the hospital districts (100%) and the primary healthcare centres (96%) used such a register, while the figures in 2017 were 95% and 97%, 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 gradually increased since 2014. They remain in 2020 more prevalent in hospital districts than in primary healthcare (Figure 24). In private sector, such functionalities were quite generally in use.
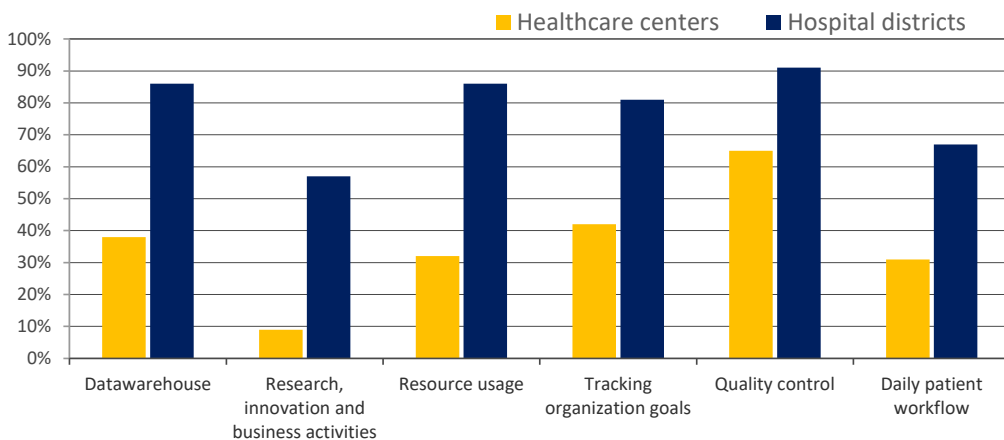

Figure 24. Prevalence of datawarehouses and integration of administrative databases into EPRs in Finnish public healthcare in 2020.

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 organization 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 5. Compared to the 2014 and 2017 surveys, the availability of those components has increased.

Table 5. Proportions of health service providers with documented data security policy, data security plan, and a nominated person in charge in 2020

Provider	Data security		
	Policy	**Plan**	**Data protection officer**
Hospital districts (%)	100	90	100
Healthcare centres (%)	95	93	98
Private service providers (n)	11/12	11/12	12/12

At the *hospital district* level, 67% of organisations had a Business Continuity Plan (BCP) and 76% a Disaster Recovery Plan (DRP). These figures are a little bit higher than in 2017 survey. About 38% of organizations 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 2019 the actualized time was 0-0.4%.

Management of informed consent

Legislation on patient consent came into 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.

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.

Electronic identification of patients

Healthcare organisations provide some electronic services requiring identification of patients and the usage of the identification methods has increased since 2017. Among *hospital districts* identification of patients in electronic services was in use in 100% of organisations. The strong authentication method was based on the national Suomi.fi – service (includes options for smart card, online bank ID, or mobile identification) in all organisations. In addition, user name and password were used for some services in 43% of organisations.

Among *healthcare centres* the national Suomi.fi – service was used in 70% of organisations. In addition, user name and password were used for some services in 22% of organisations.

Among *private service providers*, the national Suomi.fi identification service was in use in 6/12 organisations, in addition user name and password were used for some services in 3/6 of organisations.

Self-registration for appointment with a registration machine was in use in 81% of hospital districts. The functionality was more widely available than in 2017.

Supplementary material

Some of the results presented in this chapter can be viewed online using the dynamic database 'Use of information and communication technology in health care 2011, 2014, 2017 and 2020. University of Oulu (FinnTelemedicum) and Finnish Institute for Health and Welfare.' (https://thl.fi/en/web/information-management-in-social-welfare-and-health-care/what-is-information-management-/follow-up-of-the-information-system-services-in-social-welfare-and-health-care/indicators-of-digitalisation/healthcare-organizations). The database echoes 'Information to support well-being and service renewal, e-health and e-social Strate-gy 2020' (Ministry of Social Affairs and Health 2015) and enables users to make their own selections from the materials.

References

Alanko H, Leinonen T, Reponen J, Niinimäki T, Karhunen-Lappalainen P, Aura A (1998) ESKO-verkkokertomus: sairauskertomustietoa yli organisaatiorajojen. Finnish Medical Journal 53:2590–2593 (in Finnish).

Hartikainen K, Mattila M, Viitala J (1999) Terveydenhuollon tietotekniikan käyttöselvitys. Osaavien keskusten verkoston julkaisuja 2/1999 (in Finnish). STAKES, Helsinki. Available at: https://urn.fi/URN:NBN:fi-fe201301161621 (accessed 15.11.2022).

Hartikainen K, Kuusisto-Niemi S, Lehtonen E (2002) Sosiaali- ja terveydenhuollon tietojärjestelmäkartoitus 2001. Osaavien keskusten verkoston julkaisuja 1/2002 (in Finnish). STAKES, Helsinki). Available at: https://urn.fi/URN:ISBN:951-33-1346-8 (accessed 15.11.2022).

Haverinen J, Kangas M, Raatiniemi L, Martikainen M, Reponen J (2018) How to improve communication using technology in emergency medical services? A case study from Finland. Finnish Journal of EHealth and EWelfare, 10(4), 339-353. https://doi.org/10.23996/fjhw.74143 .

Haverinen J, Keränen N, Tuovinen T, Ruotanen R, Reponen J (2022) eHealth Maturity in Finnish Public Health Care – National Development and Regional Differences: Survey Study. JMIR Medical Informatics 10(8): e35612. https://doi.org/10.2196/35612 .

Hosia P (1984) Finstar — A Comprehensive Information System for Primary Care, Scandinavian Journal of Primary Health Care, 2:4, 163-166, https://doi.org/10.3109/02813438409017715 .

Hyppönen H, Faxvaag A, Gilstad H, Gilstad H, Lars Jerlvall, Kangas M, Koch S, Nøhr C, Pehrsson T, Reponen J, Walldius Å, Vimarlund V (2013a) Nordic eHealth Indicators - Organisation of research, first results and the plan for the future. TemaNord 2013:522. Nordic Council of Ministers, 2013. Available at http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A700970&dswid=1149 (Accessed 15.11.2022).

Hyppönen H, Faxvaag A, Gilstad H, Hardardottir GA, Jerlvall L, Kangas M, Koch S, Nøhr C, Pehrsson T, Reponen J, Walldius A, Vimarlund V (2013b) Nordic eHealth Indicators: Organization of Research, First Results and Plan for the Future. Stud Health Technol Inform 192:273-7, 2013.

Hyppönen H, Kangas M, Reponen J, Nøhr C, Villumsen S, Koch S, Hardardottir GA, Gilstad H, Jerlvall L, Pehrsson T, Faxvaag A, Andreassen H, Brattheim B, Vimarlund V, Kaipio J (2015) Nordic eHealth Benchmarking: Status 2014. TemaNord 2015:539, Nordic Council of Ministers, Copenhagen, Denmark. Available at: http://dx.doi.org/10.6027/TN2015-539 (Accessed 15.11.2022)

Hyppönen H, Koch S, Faxvaag A, Gilstad H, Nohr C, Hardardottir GA, Andreassen H, Bertelsen P, Kangas M, Reponen J, Villumsen S, Vimarlund V (2017) Nordic eHealth benchmarking: From piloting towards established practice. TemaNord, 2017:528 Nordic Council of Ministers, Available http://norden.diva-portal.org/smash/get/diva2:1093162/FULLTEXT01.pdf (Accessed 15.11.2022)

Hyppönen H, Lumme S, Reponen J, Vänskä J, Kaipio J, Heponiemi T, Lääveri T (2019) Health information exchange in Finland: Usage of different access types and predictors of paper use. International Journal of Medical Informatics 122: 1–6. https://doi.org/10.1016/j.ijmedinf.2018.11.005.

Hämäläinen P, Reponen J, Winblad I (2007) eHealth of Finland – Check point 2006. Report 1/2007, STAKES, Helsinki. Available at: https://urn.fi/URN:NBN:fi-fe201204193638 (accessed 15.11.2022).

Hämäläinen P, Reponen J, Winblad I (2009) eHealth of Finland. Check point 2008. Report 1/2009, THL, Helsinki. Available at: https://urn.fi/URN:NBN:fi-fe201205085004 (accessed 15.11.2022).

Hämäläinen P, Reponen J, Winblad I, Kärki J, Laaksonen M, Hyppönen H, Kangas M (2013) eHealth and eWelfare of Finland. Check point 2011. Report 5/2013, THL Helsinki. Available at: https://urn.fi/URN:ISBN:978-952-245-835-3 (accessed 15.11.2022)

Jerlvall L, Pehrsson T (2018) eHälsa och IT i landstingen. SLIT group report. Available at: https://docplayer.se/106327592-Ehalsa-och-it-i-landstingen.html (accessed 15.11.2022).

Jormanainen V, Parhiala K, Reponen J (2019) Highly concentrated markets of electronic health records data systems in public health centres and specialist care hospitals in 2017 in Finland. (In Finnish with English abstract). Finnish Journal of EHealth and EWelfare, 11(1-2), 109-124. https://doi.org/10.23996/fjhw.75554.

Kenkimäki H, Keränen N, Haverinen J, ReponenJ. (2021) EHR-connected specialty specific auxiliary systems in public specialized healthcare 2014–2020. Finnish Journal of EHealth and EWelfare, 13(3), 237–252. https://doi.org/10.23996/fjhw.107667 .

Kiviaho K, Winblad I, Reponen J (2004a) Terveydenhuollon informaatioteknologian käyttö Oulun yliopistollisen sairaalan erityisvastuualueella. Pohjois-Pohjanmaan sairaanhoitopiirin julkaisuja 1/2004 (in Finnish with English abstract) [Use of information technology in the health care units at the Oulu University Hospital responsibility area]. Available at https://docplayer.fi/75385-Terveydenhuollon-informaatioteknologian-kaytto-oulun-yliopistollisen-sairaalan-erityisvastuualueella.html (accessed 15.11.2022).

Kiviaho K, Winblad I, Reponen J (2004b) Terveydenhuollon toimintaprosesseja ja asiointia tukevat atk-sovellukset Suomessa. Kartoitus- ja käyttöanalyysi. Osaavien keskusten verkoston julkaisuja 8/2004. ((in Finnish). Available at: https://urn.fi/URN:ISBN:951-33-1763-3 (accessed 15.11.2022).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (1995) Sosiaali- ja terveydenhuollon tietoteknologian hyödyntämisstrategia. Työryhmämuistioita 1995:27. (In Finnish) Available at: http://urn.fi/URN:NBN:fi-fe201504226382 (accessed 21.04.2022).

Ministry of Social Affairs and Health (Sosiaali- ja terveysministeriö) (2015) Information to support well-being and service renewal. eHealth and eSocial Strategy 2020. Edita Prima, Helsinki. Available at: http://urn.fi/URN:ISBN:978-952-00-3575-4 (accessed 15.11.2022).

Nøhr C, Faxvaag A, Tsai CH, Harðardóttir GA, Hyppönen H, Andreassen HK, Gilstad H, Jónsson H, Reponen J, Kaipio J, Øvlisen MV, Kangas M, Bertelsen P, Koch S, Villumsen S, Schmidt T, Vehko T, Vimarlund V (2020) Nordic eHealth Benchmarking. -Towards evidence informed policies. Nordisk Ministerråd, Copenhagen 2020. TemaNord, 2020:505. https://doi.org/10.6027/temanord2020-505 (accessed 15.11.2022).

OECD (2015) Draft OECD guide to measuring ICTs in the health sector COM/DELSA/DSTI(2013)3/FINAL. https://www.oecd.org/health/health-systems/Draft-oecd-guide-to-measuring-icts-in-the-health-sector.pdf (accessed 15.11.2022).

Pätsi A (2012) HIMSS – European EMR Adoption Model. Presentation at the Finnish Healthcare ICT conference, Helsinki 15.5.2012. Available at: https://docplayer.fi/5320142-Himss-european-emr-adoption-model-ari-patsi-terveydenhuollon-atk-paivat-helsinki-15-16-05-2012.html (accessed 15.11.2022).

Reponen J (2004) Telemedicine and eHealth Network in Northern Finland. Int J Circumpolar Health 2004; 63: 429–435. https://doi.org/10.3402/ijch.v63i4.17760 .

Reponen J, Niinimäki J (2006) Digitaalinen radiologia – modaliteeteista tietoverkkoihin. In: Radiologia Suomessa. [Radiology in Finland]. Radiological Society of Finland, WSOY, p.76–81. (in Finnish).

Reponen J (2008) Teleradiology: A Northern Finland Perspective. In: Kumar S, Krupinski EA (eds.) Teleradiology, pp 217-225, ISBN 978-3-540-78870-6. Springer Verlag, Heidelberg, Germany. https://doi.org/10.1007/978-3-540-78871-3_17 (accessed 15.11.2022).

Reponen J (2010) Teleradiology – Changing Radiological Service Processes from Local to Regional, International and Mobile Environment. Acta Universitas Ouluensis D 1077. ISBN 978-951-42-6372-9. http://urn.fi/urn:isbn:9789514263729 (accessed 15.11.2022).

Reponen J, Kangas M, Hämäläinen P, Keränen N (2015a) Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2014, Tilanne ja kehityksen suunta. Raportti 15/2015, THL, Helsinki. (in Finnish with English abstract). Available at: https://urn.fi/URN:ISBN:978-952-302-486-1 (accessed 15.11.2022).

Reponen J, Kangas M, Hämäläinen P, Keränen N (2015b) Availability and use of e-health in Finland. Chapter in E-health and e-welfare of Finland - Check point 2015 (Eds) Hyppönen H, Hämäläinen P, Reponen J. Report 18/2015, THL, Helsinki. Available at: https://urn.fi/URN:ISBN:978-952-302-563-9 (accessed 15.11.2022).

Reponen J, Kangas M, Hämäläinen P, Keränen N, Haverinen J (2018) Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2017, Tilanne ja kehityksen suunta. Raportti 5/2018, THL, Helsinki (in Finnish with English abstract). Available at: https://urn.fi/URN:ISBN:978-952-343-108-9 (accessed 15.11.2022).

Reponen J, Kangas M, Hämäläinen P, Haverinen J, Keränen N (2019) Availability and use of e-health in Finland. Chapter in E-health and e-welfare of Finland - Check point 2018 (Eds) Vehko T, Ruotsalainen S, Hyppönen H, Report 7/2019, THL, Helsinki. Available at: https://urn.fi/URN:ISBN:978-952-343-326-7 (accessed 15.11.2022).

Reponen J, Keränen N, Ruotanen R, Tuovinen T, Haverinen J, Kangas M (2021) Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2020, Tilanne ja kehityksen suunta. Raportti 11/2021, THL, Helsinki (in Finnish with English abstract). Available at: https://urn.fi/URN:ISBN:978-952-343-771-5 (accessed 15.11.2022).

Ruotanen R, Kangas M, Tuovinen T, Keränen N, Haverinen J, Reponen J (2021). Finnish e-health services intended for citizens – national and regional development. Finnish Journal of EHealth and EWelfare, 13(3), 283–301. https://doi.org/10.23996/fjhw.109778 .

Social Insurance Institution of Finland (2022) About Kanta Services. A website. Available at: https://www.kanta.fi/en/about-kanta-services (accessed 15.11.2022)

THL, Finnish Institute of Health and Welfare (2022). Tarvevakioidut menot [social and health care per capita net expenditures, service needs and need-adjusted expenditures]. A website (in Finnish). Available at https://thl.fi/fi/web/sote-uudistus/talous-ja-politiikka/kustannukset-ja-vaikuttavuus/rahoitus/tarvevakioidut-menot (accessed 15.11.2022).

Winblad I, Reponen J, Hämäläinen P, Kangas M (2006) Informaatio- ja kommunikaatioteknologian käyttö Suomen terveydenhuollossa. Stakes, Raportteja 7/2006, Helsinki. (in Finnish with English abstract). Available at: https://urn.fi/URN:NBN:fi-fe201204193788 (accessed 15.11.2022).

Winblad I, Reponen J, Hämäläinen P (2007) Terveydenhuolto ei hyödynnä ambulanssien informaatioteknologiaa. Suomen Lääkärilehti 24; 62:2393 - 2395.(in Finnish).

Winblad I, Reponen J, Hämäläinen P, Kangas M (2008) Informaatio- ja kommunikaatioteknologian käyttö Suomen terveydenhuollossa vuonna 2007. Tilanne ja kehityksen suunta. Raportteja 37/2008. Stakes. Helsinki. (in Finnish with English abstract. Available at: https://urn.fi/URN:NBN:fi-fe201210319557 (accessed 15.11.2022).

Winblad I, Reponen J, Hämäläinen P (2012) Tieto- ja viestintäteknologian käyttö terveydenhuollossa vuonna 2011. Tilanne ja kehityksen suunta. Raportti 3/2012.Terveyden ja hyvinvoinnin laitos THL. Tampere (in Finnish with English abstract). Available at: https://urn.fi/URN:NBN:fi-fe201205085463 (accessed 15.11.2022)

Legistlation:

Act on Health Care 1326/2010

Availability and use of e-welfare in Finland

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In Finland, the social welfare service system seeks to secure people's well-being by providing the necessary services and resources to support people's everyday life in crises, vulnerable and otherwise special life situations. Thus, social welfare concerns a wide range of people in different life situations and stages. The generation of information about social welfare clients, information practices and information management, as well as the utilization of that information are ways to identify, map, compile and respond to people's needs as comprehensively as possible. The role of information management in social welfare is to make relevant and comprehensive information available to clients, employees, managers and other actors regionally and nationally in public, private and third sector social welfare organizations, which secures the availability of client information where the client is served (Kärki & Ryhänen, 2015b; Kuusisto-Niemi et al., 2018; Ministry of Social Affairs and Health, 2015).

The developments of Finnish national social welfare information management dates back several decades, and has been enhanced by several programmes and development projects. The most important development projects include a national project for IT in the social services (Tikesos) between 2005 and 2011, that created a basis for a national information management architecture, defined uniform operating processes and created a data model for client information systems (CIS) (Ailio & Kärki, 2013). Later the National Client Data Archive (Kanta Services) was established, legislation has been updated and social welfare professionals have been trained to improve the quality of documentation and efficiency (Kuusisto-Niemi et al., 2018). These developments are taking social welfare towards systematic and unified information processing that will enhance the opportunities for the utilization of information at the national, regional and organizational levels (Ministry of Social Affairs and Health, 2015). Kanta Services are described in more detail 'Finnish healthcare and social care system and ICT-policies -chapter'.

This chapter is based on a national survey conducted in 2020 that addressed the situation of the social welfare information management in public, private and third sector organisations in Finland (Salovaara et al., 2021). The survey continues a series of surveys conducted in 2011, 2014 and 2017 that mapped the management of social welfare information and that have been reported in English in previous Check Point-reports (Hämäläinen et al., 2013; Hyppönen et al., 2015; Vehko et al., 2019). The survey was conducted as part of the 'Monitoring and assessment of social welfare and healthcare information system services 3.0' project.

Data collection

The survey on e-welfare was targeted to public, private and third sector social welfare service providers. In Finland, public service providers include municipalities, joint municipal authorities, and special care districts. At the beginning of 2020, Finland had 310 municipalities and 17 special care districts. Information of public service providers was retrieved from websites operated by the Association of Finnish Municipalities and the information was refined using service-specific websites when necessary (Association of Finnish Municipalities, 2020). Information of non-public social welfare organisations was requested from the National Supervisory Authority for Welfare and Health (Valvira) in January 2020. The information provided by Valvira contained the data of 3,693 organisations for which detailed information was retrieved from Suomen Asiakastieto Oy (a company that provides digital business and consumer information services) in February 2020. The data obtained from Suomen Asiakastieto Oy contained a total of 4,726 business identity codes (Y-ID), with which the information of the organisations were scrutinized more closely. Organisations whose main activity was identified as social welfare and whose contact information was available were selected for the target group. Following the experience of the previous data collection, small organisations were excluded from the survey, since it was assumed that small, private practitioners do not have an electronic client information system. The final target group consisted of 1,619 social welfare organizations, whose contact information was supplemented by Internet searches.

The questionnaire was composed based on previous surveys to maintain the series of measurements. However, questions needed updating to account for the changes in legislation and renewed information needs. The themes of the survey included information systems, knowledge-based management, information exchange, data management, digital services, readiness to join the Kanta Services for Social Welfare and estimations of ICT expenses. Some of the questions were programmed in an electronic questionnaire to appear only to specific types of organizations or based on previous responses. Therefore, the number of respondents by question varies. The questionnaire was tested by seven experts familiar with social welfare management or information management.

Data collection was carried out using the online survey tool Webropol 3.0. An email survey with a cover letter and instructions were sent to 1,946 organizations using private links. Data collection started on March 10th in 2020 but had to be suspended due to the COVID-19 pandemic. The data collection was resumed on August 12th in 2020 and the survey response links were closed on October 30th in 2020. During the second phase of the data collection, the respondents who had already answered in spring 2020 were offered an opportunity to update their responses if necessary to reflect the situation in autumn 2020. Respondents were contacted and motivated to answer through several reminder messages, as well as by phone. Some of the

respondents supplemented their responses further afterwards and a few replies were revised during the data review process.

In total, 356 responses were finally received. The final data contained 90 public social service providers (58 municipalities, 22 joint municipal authorities and 10 special care districts), and 266 private (164) and third sector (102) social service providers. The responses of municipal social welfare covered one half (154) of the municipalities and 73.8% of the Finnish population. Ten out of 17 (58.8%) of special care districts responded to the survey. In light of these figures the response rate of public social welfare providers is considered good. Additionally, compared to previous surveys, there was a slight increase in the response rate (Kärki & Ryhänen, 2015a; Kuusisto-Niemi et al., 2019).

For non-public organizations, the response rate was below twenty (16.4%) and a non-response analysis was carried out to examine the representativeness of the data. A quantitative non-response analysis showed that non-responders and responders did not differ from each other statistically significantly in terms of their background characteristics (geographical location of the organization, the nature of the social services provided by the organization, the number of employees of the organization and turnover). A qualitative non-response analysis was also carried out. The method used consisted of written notes on the phone calls to organizations who had not responded. The organizations reported several reasons for the failure to respond: outdated contact information, lack of CIS, general business and number of queries, additional work caused by the COVID-19 pandemic or concurrent pressure related to funding applications. The response rate of non-public organizations has remained low also in previous surveys (Kärki & Ryhänen, 2015a; Kuusisto-Niemi et al., 2019). The data from 2020 can be considered representative regarding non-public social welfare organizations despite the low response rate.

The data were analysed using descriptive methods. The results of the survey are reported by comparing responses received from public (n=90) and non-public (private or third sector) (n=266) social welfare organizations with each other. These organizations provide a vast array of different social services. As is reflected in Figure 25, the public sector has a wider responsibility to arrange and finance social services in general in their respective area, while private and third sector organizations tend to focus on a specific service or client group as they act as service providers. Exceptions are large national or international private sector companies with large volumes of activity and that operate in several areas. The mentioned differences in the organizational profiles create significant variations between sectors and affect the organizations' information management requirements.
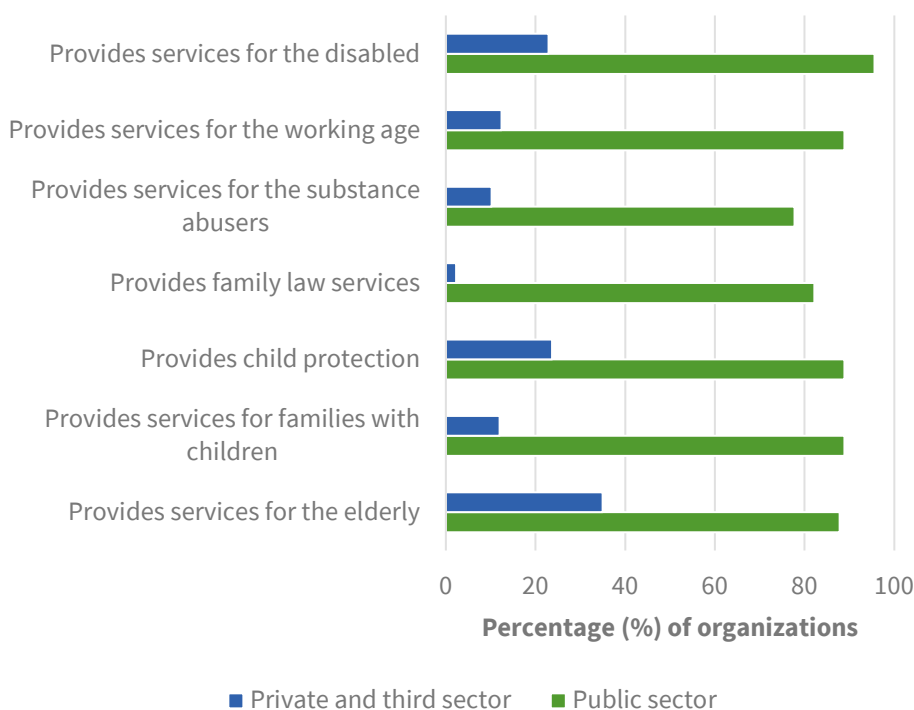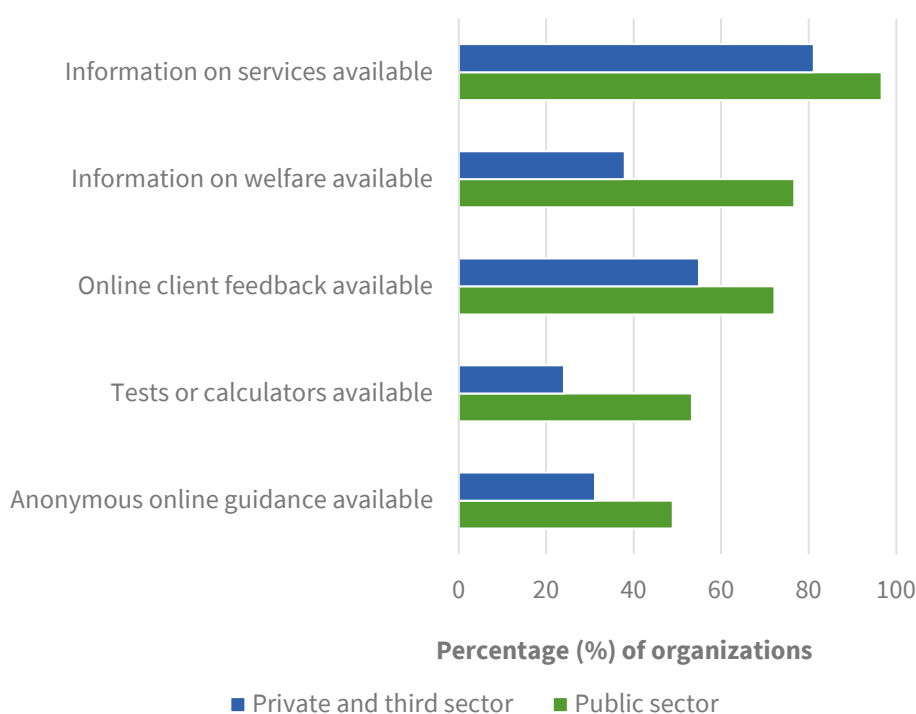
Figure 25. Percentage of organizations that provide the service in question of the organizations that responded to the survey (public n=90, private and third sector n=266)

Availability of digital social services for citizens

Social welfare organizations offer a variety of services in general. The services that are offered by each organization vary depending on the nature of the organizations' field of service. For example, an organization that offers accommodation services might not have appointment services available. Thus, not all digital services are relevant for all organizations. This is why the availability of digital services are analyzed by taking into consideration the organizations' scope of services in general.

The digital services provided by the organizations were examined in the study with regard to general digital services and digital services for clients. General digital services are those that any organization can provide to citizens, such as websites that provide information about the organization's activities or digital feedback. Digital services for clients, on the other hand, refer to services for social welfare clients, such as online booking or remote appointments.

General digital services provided by public and private or third sector organizations are presented in Figure 26. Of the digital services provided by social welfare organizations, the most typical were websites providing information on the organization's services. Almost all organizations provided this kind of website (97% of public and 81% of private or third sector organizations). General information about social welfare was provided on the website by 77% of public and 38% of private and third sector organizations, while digital customer feedback was provided by 72% of public and 55% of private and third sector organizations. Half (49–53%) of public social welfare organizations also provided tests or calculators and anonymous guidance digitally, while less than a third of private and third sector organizations (24–31%) offered such digital services, respectively.

Percentage (%) of organizations

■ Private and third sector   ■ Public sector

Figure 26. Percentage of organizations that offer the service digitally of organizations that responded to the survey (public n=90, private and third sector n=266)

The most commonly offered digital services for clients were remote appointments and online communications, and these were offered by the majority (69–77 %) of public sector organizations, and half (46–49 %) of the private and third sector organizations (Figure 27). Online applications were available for 48% of public and 29% of private and third sector organizations. One third (31–34%) of organizations offered digital

decision delivery and one fourth (21–26%) offered online bookings. Digital service plans were offered quite rarely (25% of public and 4% of private and third sector organizations).
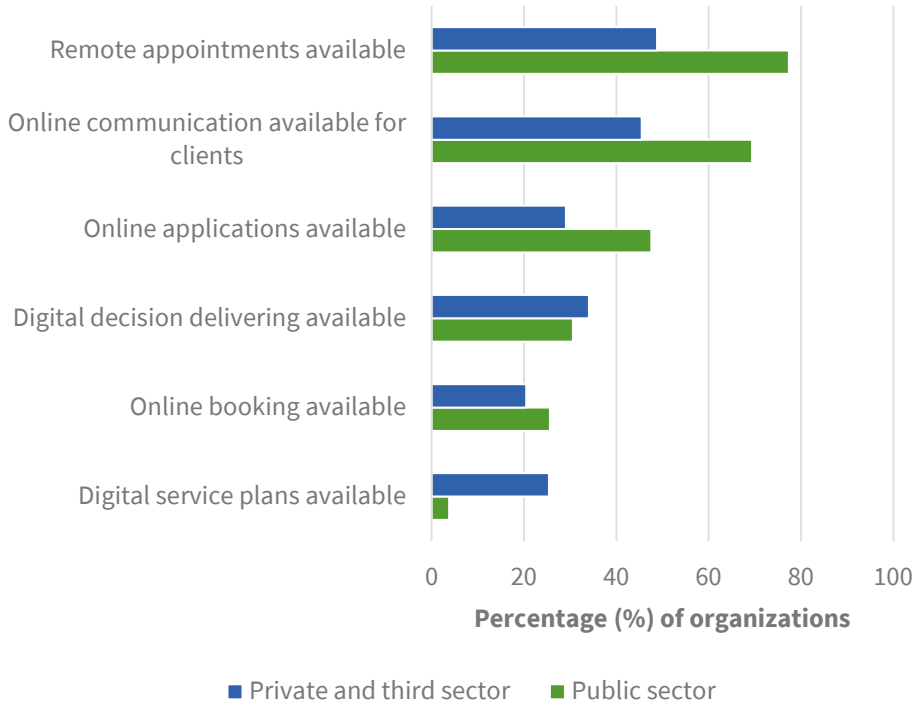
Figure 27. Social welfare services provided by the respondents: Percentage of organizations that offer the service digitally of those organizations that include the service in their supply of services (public n=82–85, private and third sector n=73–88)

In 2020, digital services were offered by slightly more organizations than before compared to the situation in 2017. There has been an increase in the provision of remote services in particular, which has been affected by the COVID-19 pandemic. The pandemic forced many organizations to rapidly deploy digital services (Harrikari et al., 2021). The transition towards digital services clearly requires more arrangements and support in the future. The use of online booking is still quite rare in social services, even though it has the potential to free up employees' resources for direct client work when clients take care of the bookings independently. However, this requires the use of an electronic booking system, which professionals also undertake to use.

When developing digital services, it is important to remember that they are not suitable for everyone and in all situations (Heponiemi et al., 2021). This perspective

is particularly important to consider in social services, where some clients are in vulnerable positions and for whom a social service can be the last resort. The use and opportunities for digital services can be promoted by paying more attention to their usability and accessibility and by utilizing research to support the future development of these services (Kivistö et al., 2020). However, access to social services must always be guaranteed, also in situations where the use of digital services is not possible.

Social welfare professionals' digital competence and access to information technology

In Finland, CISs were already used in almost all the municipalities (public sector) at the end of 1990s. The markets for social welfare CISs have long been highly concentrated in terms of brands, especially in public services (Jormanainen et al., 2019). However, the range of CISs is relatively wide, and systems developed for healthcare are also used in social services (Kuusisto-Niemi et al., 2018; Salovaara et al., 2021). Due to the wide range of services, public organizations can have multiple CISs in use (Jormanainen et al., 2019). Of all public organizations, who responded to the survey, 99 % have electronic CIS in use, whereas for private and third sector organizations the corresponding proportion was 74%. This reflects the aforementioned aspects of the different requirements for information management in different organizations, which are affected by differences in volumes and operational scopes.

The proportion of client data stored in information systems is important for the utilization of information, especially from the point of view of the secondary use of information (Act on the Secondary Use of Health and Social Data, 2019). In 2020, the relative proportion of produced data stored in information systems had increased by five percentage points in public organizations and 35 percentage points in non-public organizations since the previous data collection. As many as 90% of public organizations and 86% of private and third sector organizations reported storing at least 80% of their client data in information systems in 2020, compared to 85% of public and 51% of non-public organizations in 2017 (Kuusisto-Niemi et al., 2019). This development is important since it is a prerequisite for collating comprehensive client information into Kanta Services.

Adequate information management skills of the personnel are a prerequisite for high-quality information production and utilization of information systems. Respondents to the survey were asked what kind of information management training the organization has provided to its personnel during the past year (Figure 28). Overall, the provision of information management training for the personnel was more common in public social welfare organizations compared to non-public social welfare organizations. The most common training offered in both the public and non-public sectors was training related to the CISs (65–79%), education on data protection or security (54–74%) and training to support structured documentation (27–66%). Over half of

the public social welfare organizations (57%) also provided education on Kanta Services, while the provision of this education was less frequent in non-public organizations (11%). Education on work methods or processes was provided in 39% of public organizations and 17% of non-public organizations. Correspondingly, 32% of public social welfare organizations and 18 % of non-public organizations provided education in the legislation of information management.
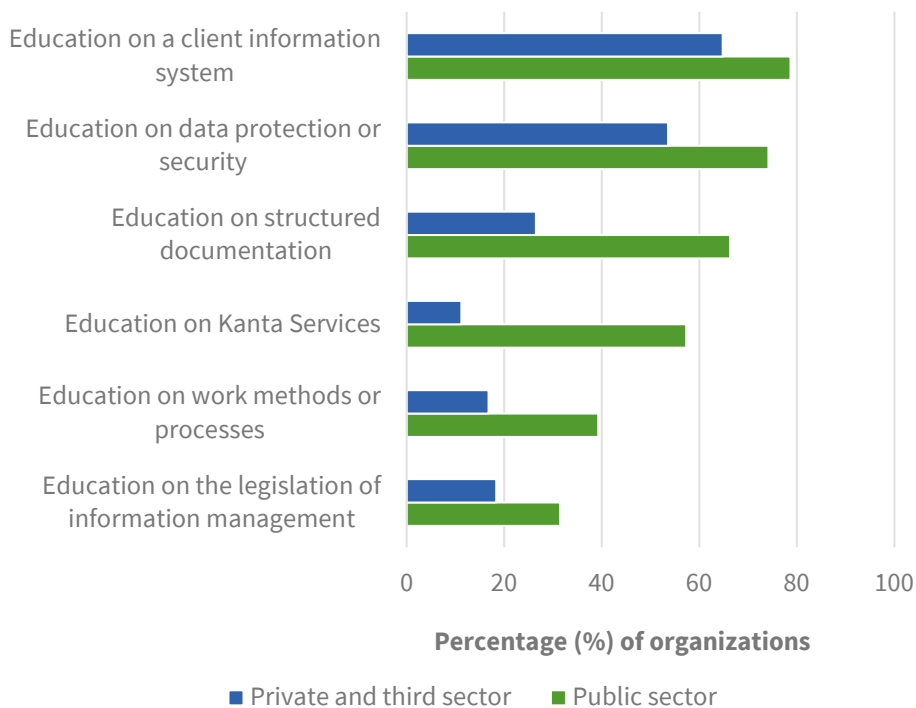
Figure 28. Percentage of organizations that have provided education on the theme of those that have an electronic client information system (public n=89, private and third sector n=196)

The development of Finnish social and healthcare information management in recent years has created a need for diverse training to strengthen the information management competence of professionals. The results presented here show that social welfare organizations provide a wide range of information management training for professionals, including training on data protection and security. Providing and implementing such diverse training can be a challenge, especially for smaller organizations, so collaboration between organizations in this area can be recommended.

Information transfer and resources in the service system

The eHealth and eWelfare Strategy 2020 (Ministry of Social Affairs and Health, 2015) set a goal of taking the limited resources of the service system into proper use. This meant, among other things, that client and patient data generated in social and healthcare would be available to professionals regardless of time, place and organizational structures. Effective solutions for information management and the flow of information are expected to improve the efficiency and effectiveness of the service system (Ministry of Social Affairs and Health, 2015). In this study, these above-mentioned themes were examined from the perspectives of solutions supporting information exchange, the development of information exchange, resources, and an estimation of costs related to information management.

The objectives of the information exchange are supported by employees' access to information from information sources necessary for their work. This can be sustained by enabling access for employees to different information systems, crossing organizational boundaries where necessary. In the survey, respondents were asked to report access possibilities that have been provided for their employees in other information systems than the principal CIS they usually use (Figure 29). All of the public sector organizations that responded to the question had provided access to at least one other information system. Half (53%) of private and third sector organizations reported their employees had no access to other information systems. In general, employee access to client data from other information systems was clearly more common in public social welfare organizations. In non-public social welfare organizations, only 1–14% of respondents had access to client data from various information systems. In public social welfare organizations the most common forms of access were employees' access to Kela's systems (85%), the Finnish Population Information System (84%), the municipality's finance management system (82%), the municipality's case management system (73%), TYPPI: a client service system of employment service centers (72%), the primary healthcare patient information system (62%), and the registers of the Local Register Office (55%).
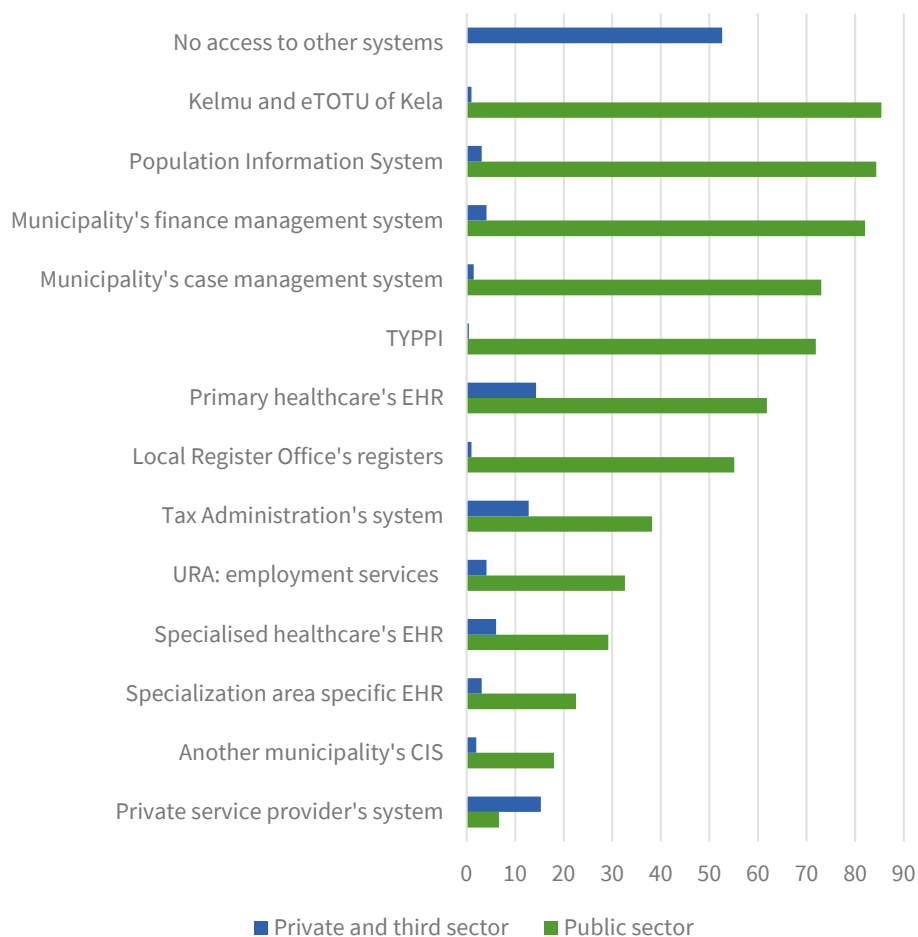
Figure 29. Percentage of organizations that have access to the information system in question of organizations that have an electronic client information system (public n=89, private and third sector n=196)

In light of these results, professionals in the public sector of social welfare have fairly well-organized access to the information they need for their work by logging in to other organization's information systems. In the future, it may be appropriate to develop CIS-integrated solutions in these situations to reduce the need for employees to log in to numerous information systems.

We also inquired how many organizations had already started used the Kanta Service (please see chapter 'Finnish healthcare and social care system and ICT-policies'). In 2020, 29% of public social welfare organizations and 11% of non-public

organizations reported using Kanta Services (Salovaara et al., 2021). In terms of using Kanta Services, the social services are at a modest level compared to healthcare, which reflects the planned phasing in the introduction of Kanta Services (Vehko et al., 2021). In social welfare, at the time of the data collection, only public organizations had been able to implement the Kanta Services voluntarily. Due to a legislation update in 2021 implementing Kanta Services will become mandatory for organizations providing social services. Public social welfare service providers have been given a transition period for implementing the Kanta Services that ends in September 2024 and private service providers a transition period that ends in January 2026 (Act on the Electronic Processing of Client Data in Healthcare and Social Welfare, 2021).

Human and material resources

The development of information management requires organizations to have sufficient resources to implement the necessary changes and maintain information management activities. The use of the resources of the service system was examined in the study considering the information management resources of social welfare organizations and information and communication technology (ICT) costs.

Information management resources were surveyed in the study by asking about the availability of information management staff in social care organizations. The majority (84%) of public and less than half (45%) of non-public social welfare organizations had their own information management staff, while less than half (38% public, 45% non-public) of the organizations purchased information management staff as an external service. Only a small proportion (5%) of public organizations did not have access to IT staff, compared with one-fifth (20%) of non-public organizations.

Organizations were also asked of material resources that they are spending on ICT. The ICT costs of the public sector were significantly higher than those of the private and third sector organizations. In 2019 the ICT costs for the majority of public organizations was over EUR 100,000 annually, and they were generally expected to increase in the coming years.

The investment costs of client information systems are presented in Figure 30. The investment costs of CISs in 2017–2019 varied greatly from less than EUR 5,000 to more than EUR 100,000 in public social welfare organizations. In non-public social welfare organizations, the investment costs of CISs were significantly lower and for the majority of respondents (82–89%) they were less than EUR 5,000 in 2017–2019. None of the non-public respondents reported that the costs exceeded EUR 50,000.
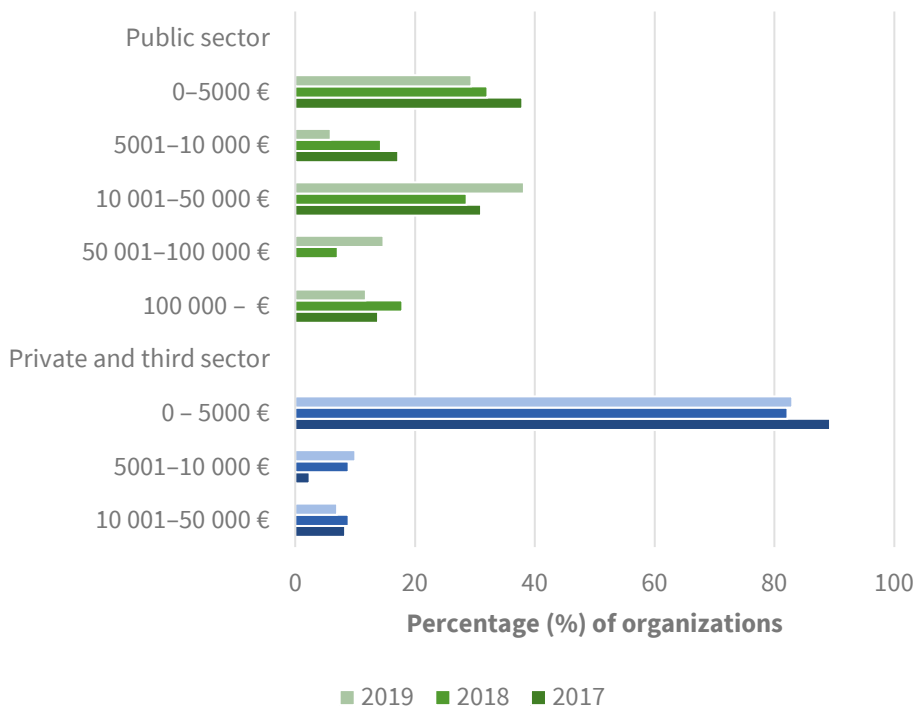
Figure 30. The change in a yearly ICT-investments (% of the respondents) in social service organisations between 2014 to 2016.

Acquiring client information systems can bring significant costs that small businesses may not be able to afford. The search for possible solutions is appropriate and should be considered in the wellbeing service counties, that started operating in January 2023. Cooperation, for example in the form of regional or multi-actor joint information system implementations, could increase the possibilities for acquiring an information system also for small organizations.

Information management and data safeguarding in social services

Careful planning and strategy work support high-quality information management and the secure utilization of client data. In accordance with the national eHealth and eWelfare strategy 2020, national data structures need to be followed in organizations and applied in social and healthcare information systems to provide a strong basis for information management (Ministry of Social Affairs and Health, 2015). Social welfare organizations reported to what extent they have implemented various guidelines and plans related to information management, information security and data protection. The results are described in Figure 31 for public social welfare organizations and in Figure 32 for others.

The majority of public social welfare organizations had prepared documentation instructions (73%) and instructions in case of CIS interruption (72%). More than half (55%) also had a strategy for information management in place. One third (35%) of the organizations had an information management model in place and 42% were at the planning phase. The plans, instructions and descriptions related to data security and protection were mostly implemented in public organizations (78–97%).
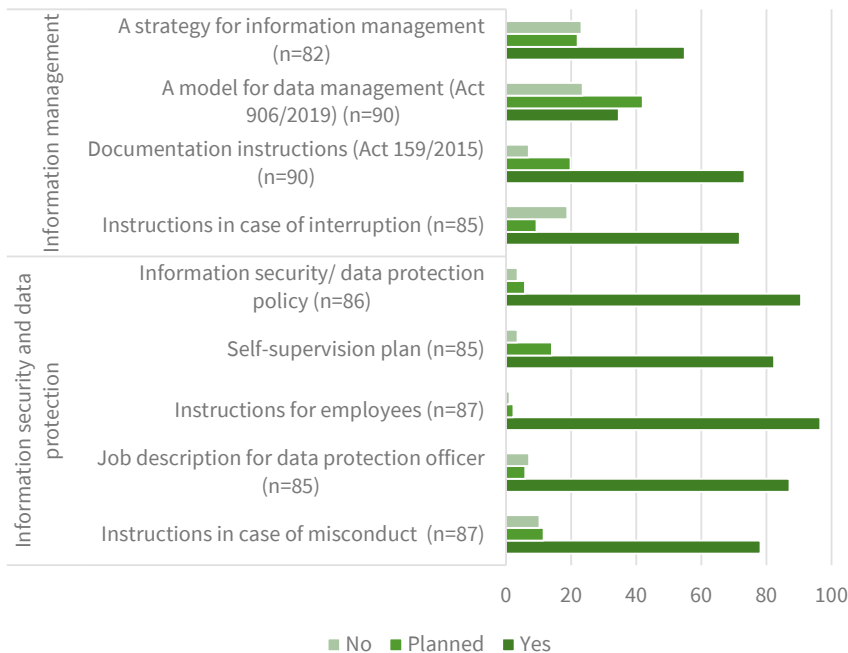
Figure 31. Percentage of public organizations that have instructions or guidelines concerning information management and information security or data protection

The majority (79–87%) of private and third-sector social service organizations had documentation, instructions, and information security policies for employees, a self-supervision plan, and an information security and/or a data protection policy. Instructions in case of CIS interruption and in case of misconduct, and the job description for a data protection officer had been prepared in more than half (62–69%) of non-public organizations. In addition, about a third (32–35%) had a strategy for information management and a model for data management in place. In addition, a small proportion of respondents (4–15%) were currently planning these plans and guidelines.
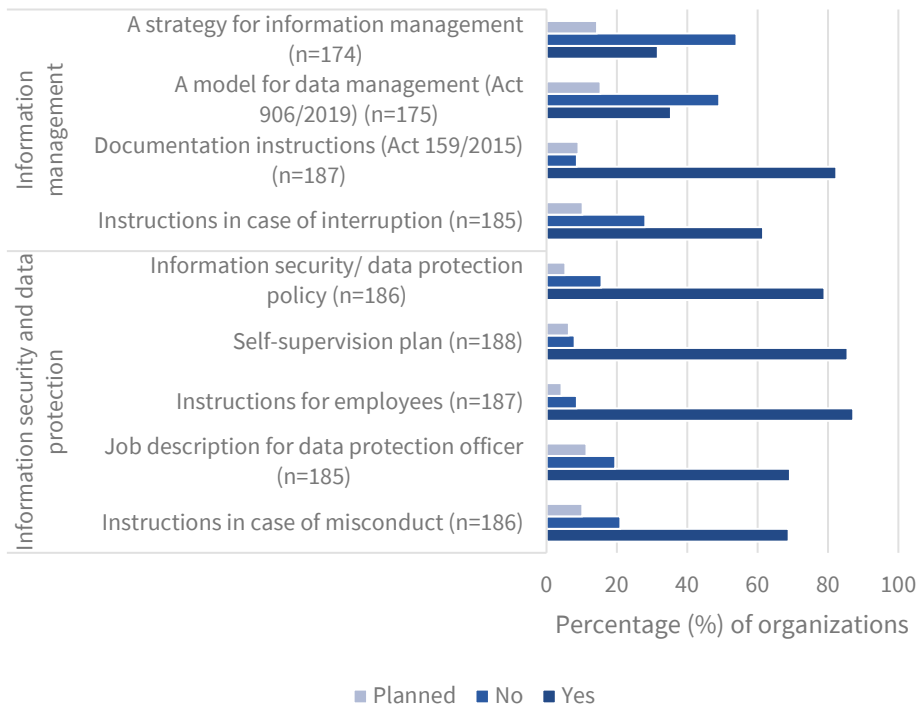
Figure 32. Percentage of private and third sector organizations that have instructions and guidelines concerning information management and information security or data protection

In 2017, the national Population Register Center (now the Digital and Population Data Services Agency) also expanded its certification activities to social welfare, giving all social and healthcare professionals the opportunity to obtain professional ID cards. The professional ID card serves as a tool for secure electronic identification and thus supports data security and data protection in social and healthcare CISs. Professional ID cards are used to verify the access rights of each professional in information systems, including Kanta Services, and to ensure the integrity and confidentiality of client

data. Professional ID cards have a limited period of validity and to obtain the card one must have valid professional practice rights. The professional ID cards can therefore be considered as an indicator of the secure and data-protected login solutions in organizations.

We examined the proportions of those holding professional ID cards within organizations that use an electronic CIS (public n=89, private and third sector n=196). The proportions of professionals holding a professional ID card was clearly higher in public social welfare organizations compared to private and third sector organizations. Of the public organizations, a total of 33% of the respondents reported that the share of holders of professional ID cards exceeded 80%, while the share of non-public organizations was 16%. (Salovaara et al., 2021)

Ensuring data security and data protection is important in social services, as information about clients is confidential. The rights to view and use client data must be strictly monitored and compliant with official regulations (Act on the Electronic Processing of Client Data in Healthcare and Social Welfare, 2021). In this critical area related to information security and data protection, where a lot of expertise is needed and the organization requires jointly agreed policies there is still a lot of room for improvement in many places.

Standards and information structures in social welfare

The legislation regulates the data structures of information systems and client documents related to Kanta Services (Act on the Electronic Processing of Client Data in Healthcare and Social Welfare, 2021). According to the legislation, the data structures of information systems and client documents must enable the use, delivery, storage and protection of electronic client documents and client data by means of the Kanta Services. After the transition periods set for public and private organizations have passed, the content and structure of social welfare client documents must comply with uniform client document structures defined at the national level by The Finnish Institute for Health and Welfare (THL). The client documents must then be stored in Kanta Services accordingly (Act on the Electronic Processing of Client Data in Healthcare and Social Welfare, 2021).

The use of national documentation structures in public social welfare organizations is illustrated in Figure 33 and in non-public social welfare organizations in Figure 34. About half (42–55%) of the public social welfare organizations that responded to the question had national documentation structures entirely in use, and almost a third (26–32%) had these partially in use. Some (5–12%) of the respondents did not know about the organization's situation regarding the use of document structures.
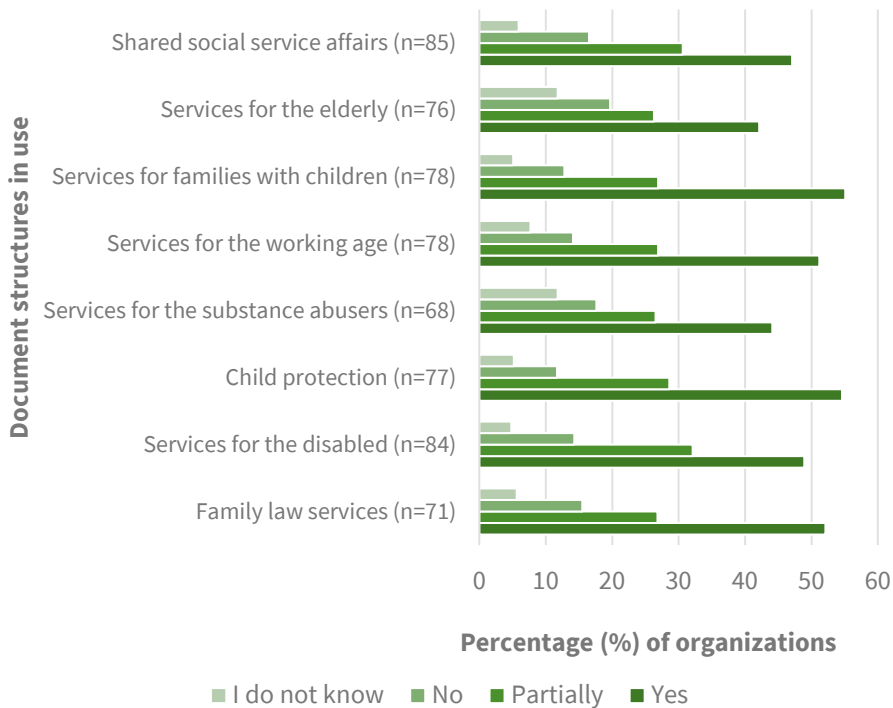
Figure 33. Percentage of public organizations by service area that have implemented the document structures

In private and third sector social welfare organizations (n=6–92), the use of national document structures was lower than in public organizations. For the most part, about a third (22–40%) had documentation structures in place for different service lines and 10–28% of organizations had these partially in use, with the exception of family law services, where documentation structures were used by half (50%) of the respondents. However, there were only six organizations providing family law services that responded to the question, so the result is to be treated with caution. In some places, as many as a quarter of respondents from non-public social welfare organizations were unaware of the situation regarding the use of document structures.
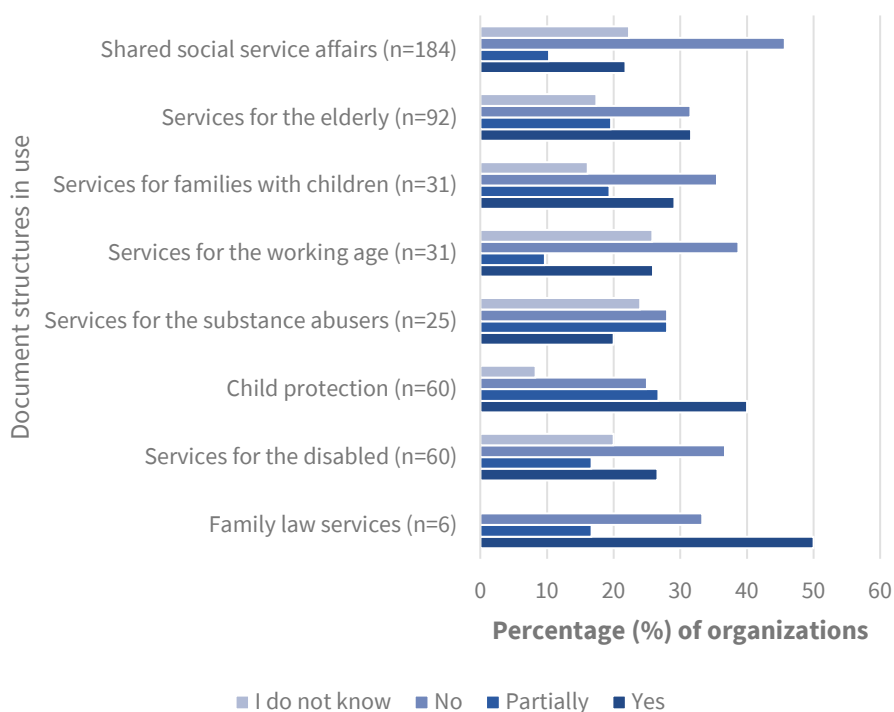
Figure 34. Percentage of private and third sector organizations by service area that have implemented the document structures

In addition to ICT services, a high-quality information structure refers to content and technical specifications, the consistency of which supports the flow of information and functionality (Ministry of Social Affairs and Health, 2015). In particular, from the point of view of the usability of data and information, compatible national data structures will substantially support the achievement of these objectives. For social welfare organizations, this requires the introduction of national data management definitions and data structures and co-operation with other actors. Of particular concern is the lack of knowledge in some organizations on whether national information management solutions have been implemented. Social welfare leaders need to be aware of the processes by which data is produced and information generated at different levels of the organization. Managers should ensure that information is used appropriately and that the organization has sufficient understanding and expertise for quality information production at all levels of the organization. In these respects, information management cannot be outsourced to information management personnel or an information system supplier, for example.

References

Act on the Electronic Processing of Client Data in Healthcare and Social Welfare, Pub. L. No. 784 (2021).

Act on the Secondary Use of Health and Social Data, Pub. L. No. 552 (2019).

Ailio, E., & Kärki, J. (2013). Sosiaalihuollon asiakastietomalli. Finnish Journal of EHealth and EWelfare, 5(2–3), 40–49.

Associaltion of Finnish Municipalities. (2020). Kunnat ja kuntayhtymät | Kuntaliitto.fi. https://www.kuntaliitto.fi/kunnat-ja-kuntayhtymat

Hämäläinen, P., Reponen, J., Winblad, I., Kärki, J., Laaksonen, M., Hyppönen, H., & Kangas, M. (2013). eHealth and eWelfare of Finland - Checkpoint 2011. National Institute for Health and Welfare. http://urn.fi/URN:ISBN:978-952-245-835-3

Harrikari, T., Romakkaniemi, M., Tiitinen, L., & Ovaskainen, S. (2021). Pandemic and Social Work: Exploring Finnish Social Workers' Experiences through a SWOT Analysis. British Journal of Social Work, 51(5), 1644–1662. https://doi.org/10.1093/bjsw/bcab052

Heponiemi, T., Gluschkoff, K., Leemann, L., Manderbacka, K., Aalto, A. M., & Hyppönen, H. (2021). Digital inequality in Finland: Access, skills and attitudes as social impact mediators: Https://Doi.Org/10.1177/14614448211023007. https://doi.org/10.1177/14614448211023007

Hyppönen, H., Hämäläinen, P., & Reponen, J. (2015). E-health and e-welfare of Finland - Check point 2015. National Institute for Health and Welfare (THL). https://www.julkari.fi/handle/10024/129709

Jormanainen, V., Rötsä, M., & Parhiala, K. (2019). Kuntien sosiaalitoimien sähköiset asiakastietojärjestelmät vuonna 2017. Finnish Journal of EHealth and EWelfare, 11(1–2), 125–138. https://doi.org/10.23996/fjhw.76835

Kärki, J., & Ryhänen, M. (2015a). Availability and Use of e-welfare in Finland. In H. Hyppönen, P. Hämäläinen, & J. Reponen (Eds.), E-health and e-welfare of Finland - Check point 2015 (pp. 88–97). National Institute for Health and Welfare (THL).

Kärki, J., & Ryhänen, M. (2015b). Tieto- ja viestintäteknologian käyttö sosiaalihuollossa vuonna 2014. https://www.julkari.fi/handle/10024/129708

Kivistö, M., Hokkanen, L., Tiedekunta, Y., Yliopisto, L., Kivistö, R. M., & Sähköposti, R. (2020). Valtavirtateknologioita itsenäisesti käyttävien vammaisten henkilöiden eriytyvät toimijuudet sähköisten vammaispalveluiden käyttäjinä. Finnish Journal of EHealth and EWelfare, 12(1), 44–56. https://doi.org/10.23996/FJHW.86948

Kuusisto-Niemi, S., Hyppönen, H., & Ruotsalainen, S. (2019). Availability and use of e-welfare in Finland. In T. Vehko, S. Ruotsalainen, & H. Hyppönen (Eds.), E-health and e-welfare of Finland. Checkpoint 2018. (pp. 87–107). National Institute for Health and Welfare (THL).

Kuusisto-Niemi, S., Ryhänen, M., & Hyppönen, H. (2018). Tieto- ja viestintäteknologian käyttö sosiaalihuollossa vuonna 2017. https://www.julkari.fi/handle/10024/136112

Ministry of Social Affairs and Health. (2015). Information to support well-being and service renewal. eHealth and eSocial Strategy 2020 (pp. 1–31). Ministry of Social Affairs and Health; Association of Finnish Local and Regional Authorities. https://julkaisut.valtioneuvosto.fi/handle/10024/74459

Salovaara, S., Silén, M., Vehko, T., Kyytsönen, M., & Hautala, S. (2021). Tieto- ja viestintäteknologian käyttö sosiaalihuollossa vuonna 2020. http://urn.fi/URN:ISBN:978-952-343-772-2

Vehko, T., Kyytsönen, M., Jormanainen, V., Hautala, S., Saranto, K., Vänskä, J., Keränen, N., & Reponen, J. (2021). Kanta-palvelut terveydenhuollossa ja sosiaalihuollossa sekä väestön Omakannan käyttö. https://urn.fi/URN:ISBN:978-952-343-766-1

Vehko, T., Ruotsalainen, S., & Hyppönen, H. (2019). E-health and e-welfare of Finland: Check Point 2018. National Institute for Health and Welfare (THL). https://www.julkari.fi/handle/10024/138244

Figures 1–5; Source: Use of information and communication technology in social welfare organizations in 2020: Finnish Institute for Health and Welfare & University of Lapland

Figures 6–10; Source: Salovaara, S., Silén, M., Vehko, T., Kyytsönen, M., & Hautala, S. (2021). Tieto- ja viestintäteknologian käyttö sosiaalihuollossa vuonna 2020 [In Finnish with the abtract in English: Use of information and communication technology in social welfare organizations in 2020]. Finnish Institute for Health and Welfare, report 13/2021. http://urn.fi/URN:ISBN:978-952-343-772-2

Physicians' experiences of electronic health records systems

Structure of the 2021 survey and comparison to earlier surveys

Peppiina Saastamoinen

The fourth survey of physicians' experiences on electronic health record (EHR) systems and related e-services was conducted in January 2021. As previous surveys in 2010, 2014, and 2017, it was targeted to all working age physicians in clinical work in Finland. The survey was carried out in collaboration with Finnish Medical Association, Finnish Institute for Health and Welfare (THL), Oulu University and Aalto University. All together 4 683 physicians responded to the survey (Table 6).

Table 6. Demographic information on the survey respondents in 2010, 2014, 2017 and 2021

	2010	2014	2017	2021
N	14 411	16 350	17 210	19 142
Respondents	3 929	3 781	4 018	4 683
Working sector				
Public hospital	1 950	1 856	1 943	2 764
Public healthcare centre (health centre)	919	926	1 070	1 040
Private sector	587	604	665	661
Other	473	395	340	225

The results of previous surveys have been published in several national and international papers and reports. The publications cover several topics, e.g: usability of the health information systems (Viitanen et al. 2011; Kaipio et al. 2017; Kaipio et al. 2019; Kaipio et al. 2020; Viitanen et al. 2022), end-user participation on health information systems development (Martikainen et al. 2020), health information exchange (Hyppönen et al. 2019), associations of different aspects of health information systems on well-being in work (Martikainen et al. 2011; Vainiomäki et al. 2017; Heponiemi et al. 2017; Heponiemi et al. 2019), validation of the National usability focused Health Information Systems-scale (Hyppönen et al. 2018), and data description /assessment of representativeness (Vänskä et al. 2010; Vänskä et al. 2014; Saastamoinen et al. 2018). In addition, the results of the previous surveys are summarized in the e-health and ewelfare of Finland check point reports (Hämäläinen et al. 2011; Hyppönen et al.

2015; Vehko & al. 2019). The results of the fourth survey are summarized in this report.

The target groups for all four 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, living in Finland, and e-mail available. According to our analyses the respondents represent the target group reasonably well. However, older physicians and those having specialized respondent somewhat more actively than younger physicians and those not specialized.

The method of generating the first, 2010 questionnaire has been reported elsewhere (Viitanen et al. 2011). The survey has several topics including technical features, usability, patient safety, intraorganizational and cross-organisational collaboration, support for work, important areas for development, best functionalities, support for management and overall satisfaction score, in addition to background information. The questionnaire includes also questions on well-being at work (e.g. perceived work stress).

The content of the survey questionnaire has evolved as the environment related to information technology has advanced. However, to retain comparability, only essential changes have been made. New relevant topics have been introduced when considered necessary. In 2021, we added questions on 1) data protection issues and 2) how digitalization of health care has affected physician's work. The survey questionnaire 2021 is available in English in the FMA website (Finnish Medical Association, 2021).

One of the aims of the study is to assess and compare the EHR systems (trademarks) to help systems to develop and to serve physicians in their work increasingly better. The results are not presented by trademarks in this report, but information by trademarks is available in the THL database to which the analyses of this report are based. Therefore, some background information is provided here. The set of health information systems that have been evaluated in our studies, has remained quite stable. All systems have developed during the years, and some have taken bigger steps than others. Some large-scale deployments have also occurred in the field during the past 11 years. In the 2010, a new system Mediatri, was introduced and evaluated in our survey just a few months after its implementation/deployment. In 2021, Apotti's (Epic) main implementation/deployment was just a few months before our survey took place. The proximity of implementation/deployment period might affect the results and need to be kept in mind when interpreting the results.

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 (Hyppönen et al., 2019a). 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 including EHRs among physicians, but the national health policy goals need to be considered when selecting questions from questionnaire.

As stated above, the analyses in this report are based on THL Data base report (2022) and are restricted to those physicians that reported using electronic health records in their work (4 640). Measures depict proportion of physicians fully agreeing or somewhat agreeing with the statements. Responses were grouped according to the employer sector (public hospital, health center, private sector) and the employer sector and year were used as grouping variables in the analyses.

Usability of electronic health record systems

Johanna Viitanen & Tinja Lääveri

Based on the definition (ISO 9241-11, 1998), usability of EHR systems refers to the extent to which the systems can be used by specified users, physicians, to achieve their goals with effectiveness, efficiency and satisfaction in their clinical context of use.

This section presents results related to the physicians' overall satisfaction with their EHR systems based on data gathered in 2021. In addition, we report physicians' experiences on use and usability of the EHR systems with regards to ease of use and technical quality.

Overall satisfaction by employment sector

The physicians were asked to assess their principal EHR system with a school grade on a scale from 4 to 10 (4=fail …8=good, 9=very good, 10=excellent). Figure 35 illustrates the summary of grades by presenting the proportion of grades 8 and higher (9 and 10) by employment sector. The private sector EHR systems appeared to score better than those used in public hospitals and public health centres. The overall satisfaction of physicians appears to have improved between 2010 and 2021 in all sectors.
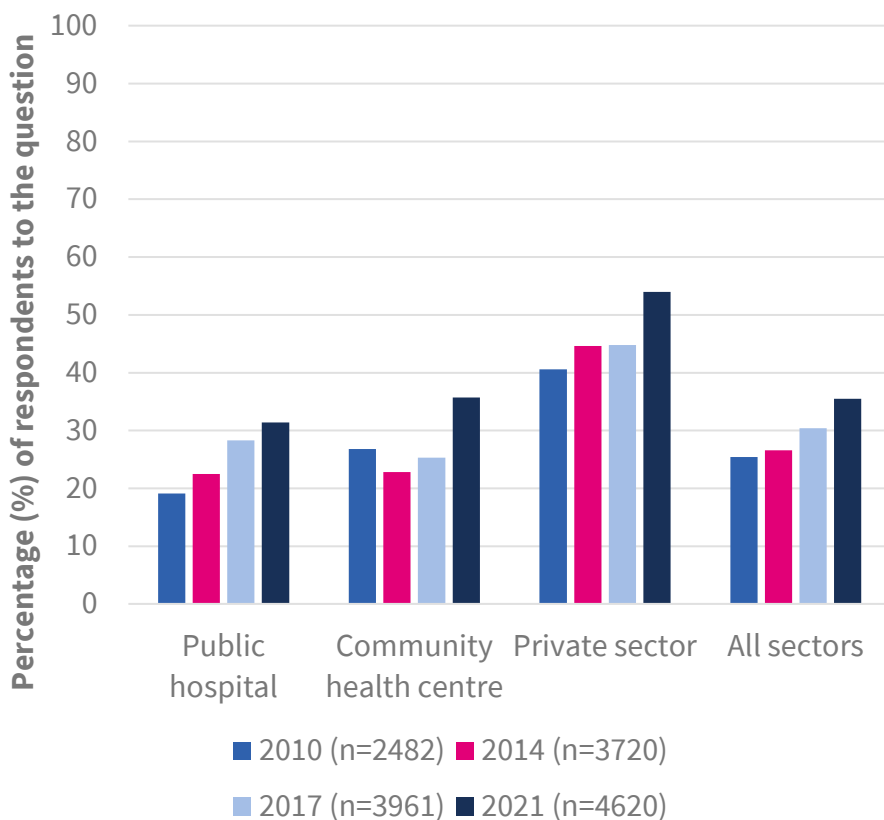
Figure 35. Per centage of those who assessed their main EHR system from 8 to 10 (corresponding to good, very good or excellent in a scale from 4 to 10) in various sectors in 2010, 2014, 2017, and 2021.

Ease of use and technical quality

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

Concerning the statements about user interface characteristics i.e. logical arrangement of the field and functions in the screen as well as how clear and understandable the terminology on the screen is, the private sector respondents appeared more positive than those from public hospitals or health centres (Figure 36).

The proportion of physicians working in public hospitals agreeing with the statement 'Routine tasks can be performed in a straightforward manner without the need for extra steps using the systems' appeared lower than of those working in health centres; the physicians working in the private sector appeared the most satisfied (Figure 36).

Also, the proportion of physicians agreeing with the statement about ease of obtaining patient data appeared the lowest among physicians working in public hospitals; those working in the private sector gave the most positive assessments (Figure 36).
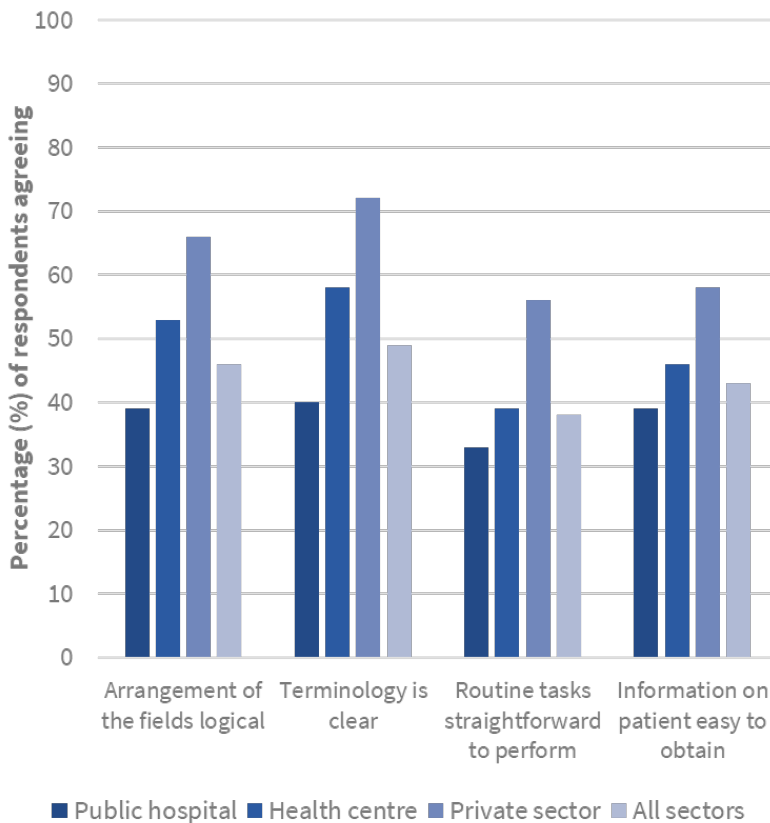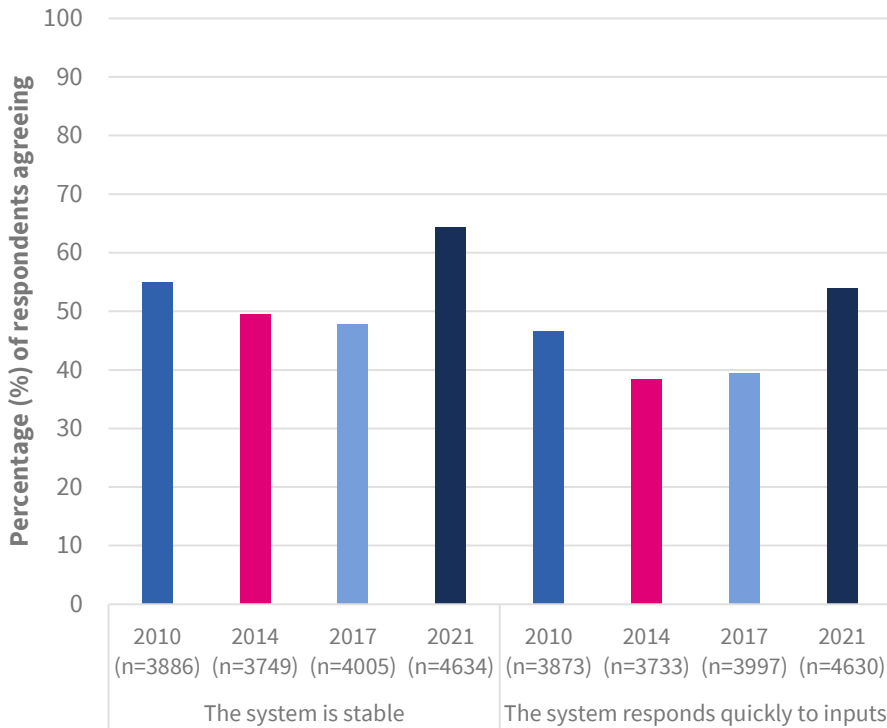

Figure 36. Proportion of physicians agreeing with ease of use related four statements by employment sector.

Few statements in the survey assessed the technical quality of EHR systems. These items were to measure reliability and safety aspects of EHR systems (Hyppönen et al., 2019).

Physicians' responses to statements 'The system responds quickly to inputs' and 'The system is stable in terms of technical functionality (does not crash, no downtime)' suggest that the technical quality of the EHRs has improved over the years (2010–2021) (Figure 37).

Figure 37. Proportion of physicians agreeing with the statements about the system being stable in terms of technical functionality and the system responding quickly to inputs.

Concerning the statement 'Faulty system function has caused or nearly caused a serious adverse event for the patient' the proportion of physicians agreeing has not decreased between 2010 and 2021 (Figure 38).
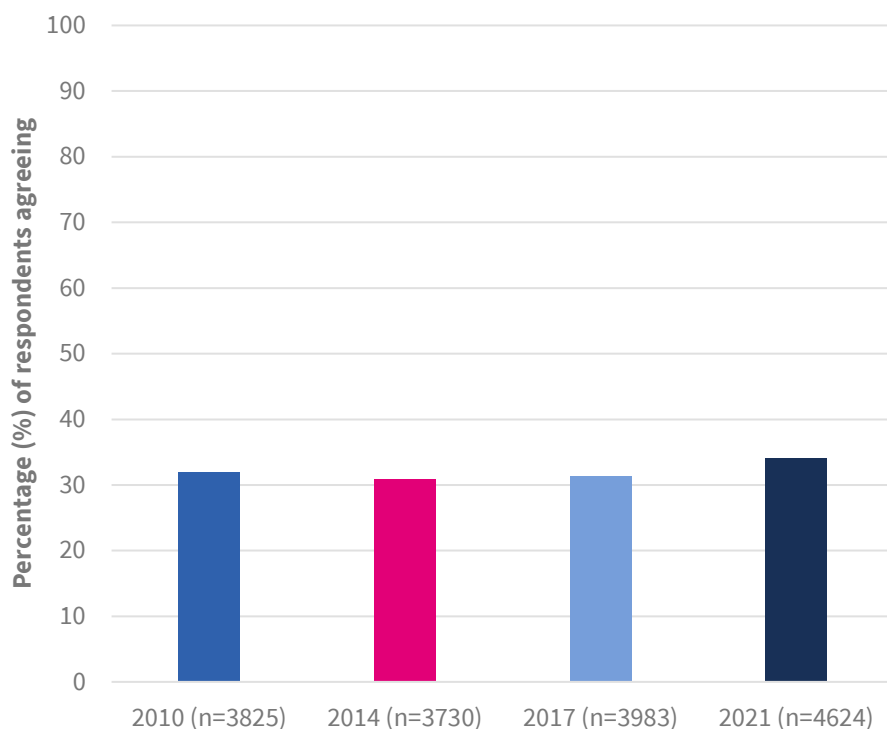
Figure 38. Proportion of physicians agreeing with the statement that faulty system function has caused or has nearly caused a serious adverse event for the patient.

Usability of health information exchange and utility of systems

Tuulikki Vehko, Tarja Heponiemi & Jarmo Reponen

Health information exchange (HIE) allows health care professionals to access and share a patient's medical information electronically in a safe manner. HIE provides the capability to electronically transfer information among different health information systems and providers. Up-to-date information can help to prevent errors by ensuring that different parties involved in a patient's care − in a primary care or a secondary care or in a pharmacy − have access to the same information. In addition, other benefits often associated with the HIE include that well-functioning HIE helps to inhibit redundant or duplicated testing and overall prevents unnecessary paperwork. (www.healthit.gov)

The objectives of the national 'Information to support well-being and service renewal - eHealth and eSocial Strategy 2020' in Finland emphasize professionals' and

clients' access to client and patient information irrespective of changes in organisation structures, services and information systems. (Ministry of Social Affairs and Health, 2014). The national solutions have been implemented to achieve fluent HIE in Finnish health care where both public and private service producer operate. (Jormanainen 2018, Jormanainen & Reponen 2020). Publicly funded health services, which are divided into primary health services and specialised health services were first to use the national HIE, Kanta Services. In the public sector, e-presciption was fully implemented by 2014 and National Patient Data Repository by 2017. Private sector has been following this development, and at the time of this survey in 2021 e-prescription is used by all private service providers, too. All private service providers using electronic health records have also joint the Kanta-services now, as requested by the law. This means that the national HIE services play a significant role when customer care requires the activities of many different service providers. Integration of services both within the healthcare and furthermore between health and social care requires a fluent information exchange.

Besides of national Kanta Services, information exchange has been regionally supported in the public sector by five different types of regional health information systems (RHIS) (Hyppönen at el 2019). The Finnish legislation of health care (https://www.finlex.fi/fi/laki/smur/2010/20101326) allows the hospital districts to keep joint patient data repositories, therefore public hospitals and health centres can view the RHIS. However, the legislation limits the private sector access to these RHISs unless otherwise pointed in separate contracts for service production. Using paper or fax was an accustomed way of operating before of the deployment electronic information exchange solutions.

This section examines physicians' experiences of HIE using the following measures: usage of different modes of HIE (paper, RHIS, Kanta Services). After this the easiness of access to HIE data was described using statements: 'Information on medications ordered in other organizations is easily available'; 'Patient data (also from other organizations) are comprehensive, up-to-date and reliable' and 'How well do you consider that information systems support collaboration and information exchange between physicians working in different organizations.' Finally, this section presents the benefits of health information systems using statements 'Information systems help to improve quality of care'; 'Information systems help to ensure continuity of care'; 'Information systems help to avoid duplicate tests and examinations.'; 'Information systems help in preventing errors and mistakes associated with medications.'; and 'Information systems support compliance and adherence with the treatment recommendations.' The data collection (2021) has been before the implementation of the health and social care reform. In the beginning of 2023 wellbeing services counties (21) and city of Helsinki, took responsibility for organizing public health and social services in continental Finland.

Usage of different modes of health information exchange

Almost one in five of physicians reported that they obtained patient data using paper or fax weekly in 2021. The proportions of paper use had diminished in all employment sectors when compared to proportions in 2017. At private sector the diminishing was the greatest (from 42% to 19%) compared with public hospitals or health centres (Figure 39 A).

Obtaining patient data via a RHIS weekly remain quite similar (37% and 41%) (Figure 39 B). At public hospitals, the proportion increased from 35 to 42%, whereas at health centres it decreased slightly (from 67 to 62%). Obtaining patient data via RHIS had only a marginal role at private sector which is likely to reflect the legislative situation in Finland.

In 2021, when the use of Kanta Services had been established in use both in the public sector and private sector, two thirds of the physicians in hospitals, 87% of the physicians in health centres and 87% of physicians in private sector used Kanta for HIE at least weekly. The increase was obvious when the proportion was 45% in 2017. (Figure 39 C)

A) Obtaining patient data using paper or fax weekly

B) Obtaining patient data via a RHIS weekly

C) Obtaining patient data via Kanta weekly
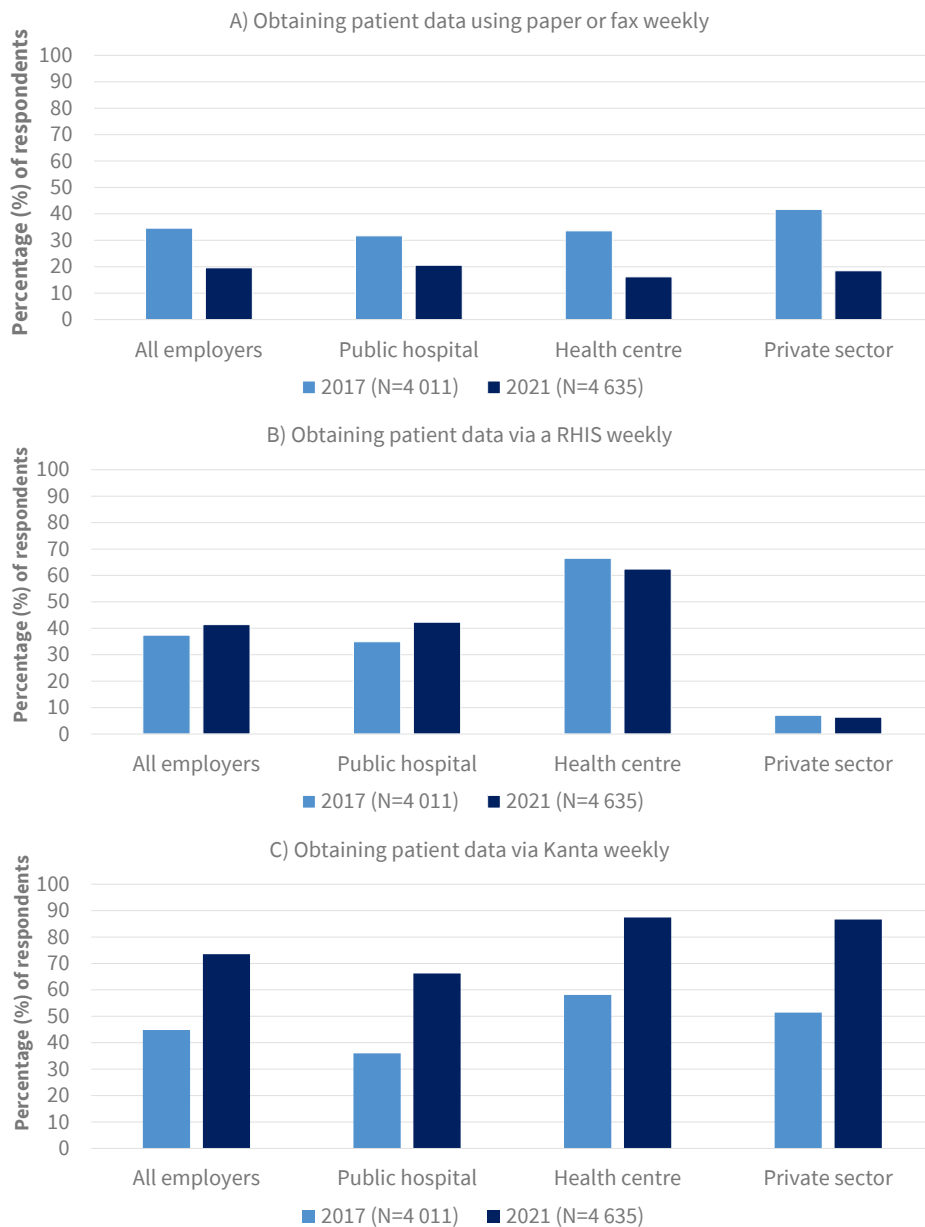
Figure 39. Progress of different HIE modes between the years 2017 and 2021. (THL Data base report)

Easiness of access to health information exchange data

Experiences of easy access to information on medication ordered in other organisations remained at a low level, only one-fifth of physicians agreed (Figure 40). The private sector joined Kanta Services after 2014, which is reflected in the increase in the proportion in 2017 and 2021. The ratings in 2017 and 2021 were highest in the private sector. The difficulties related to current information on medication in a situation where the patient moves from one place to another are widely known, and a national medication list is under development. Moreover, at the time of data collection in 2021, medication record formats varied by information systems. At the moment, Kanta Services includes the information on the e-prescriptions prescribed to the outpatients, but it is not the same as the drugs taken by the patient. Furthermore, information on prescriptions does not present drugs taken during treatment periods in hospitals. An up-to-date national list would take all information needed into account and display the overall medication currently in use.

Information on medications ordered in other organizations is easily available
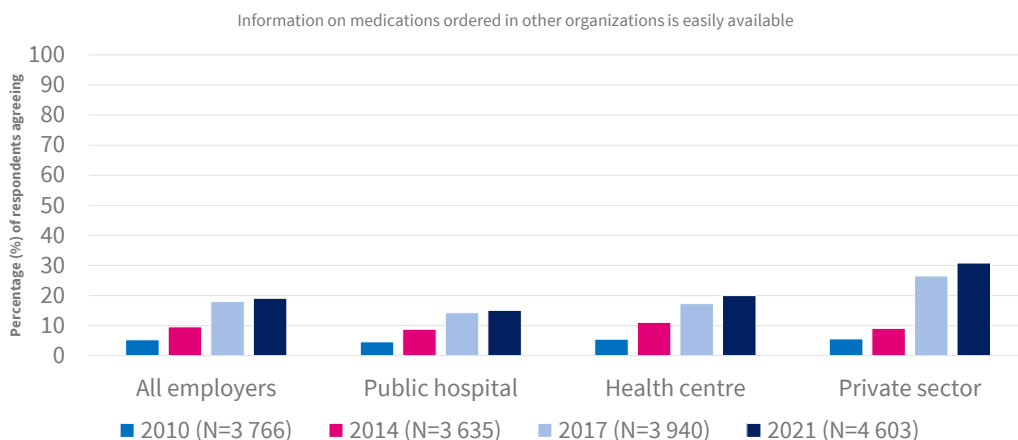
Figure 40. Proportion (%) of physicians agreeing that information on medications ordered in other organisations are easily available (THL Data base report).

Physicians' experiences of data quality were estimated with statement 'Patient data offered by EHR systems (also from other organisations) are comprehensive, up-to-date and reliable'. In 2021 a third of respondents agreed or fully agreed with this statement. The situation has remained quite similar from 2017 to 2021 in all sectors, and improved at health centres. (Figure 41).

Patient data is comprehensive
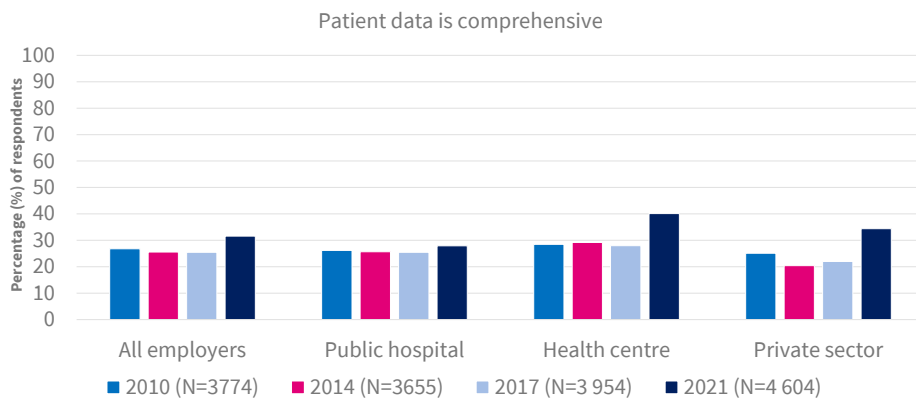
Figure 41. Proportion (%) of respondents agreeing or agreeing fully that patient data quality from other organisations is good (THL Data base report).

Benefits of health information systems

The information systems support interorganizational collaboration is measured with the question: 'How well do you consider that information systems support collaboration and information exchange between various parties?' and the statement 'Between physicians working in different organizations.' The response scale was 'very well', 'fairly well', 'neither well nor poorly', 'rather poorly' and 'very poorly'. Measures depict proportion of physicians who answered very or fairly well.

Physicians' assessment of whether ISs support collaboration and information exchange between various parties has remained at a very low level throughout the study years (Figure 42). In 2021 the proportions appeared the highest in community health centres and the lowest in private sector. A small upward trend can be seen in primary care and the private sector which may reflect the utilization of national Kanta Services.
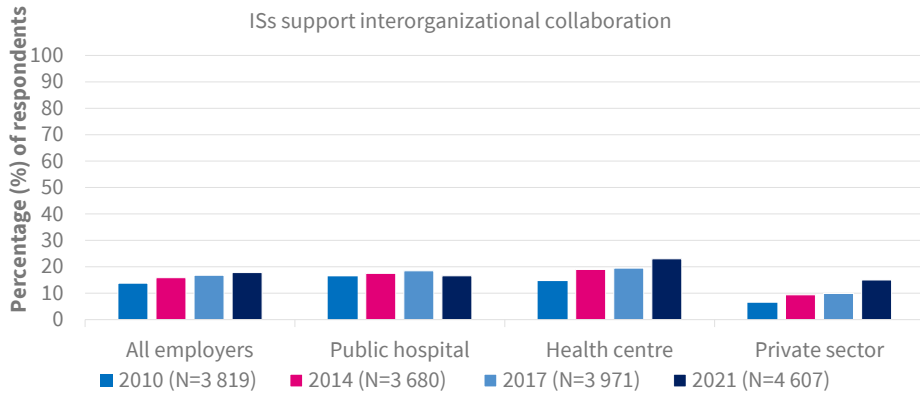
Figure 42. Proportion (%) of respondents agreeing or agreeing fully that information systems support interorganizational collaboration. (THL Data base report)

In 2021, one third (35%) of physicians agreed or agreed fully that information systems help to improve the quality of care (Figure 43). During the years the proportion in public sector has decreased and a modestly growing trend in private sector has remained.
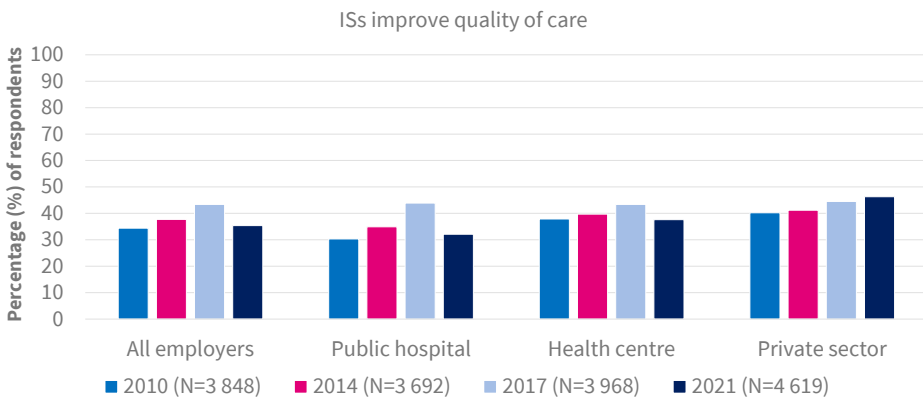
Figure 43. Proportion (%) of respondents agreeing or agreeing fully that information systems help to improve quality of care. (THL Data base report)

Less than one third (30%) of respondents agreed or agreed fully that information systems help to avoid duplicate tests and examinations. When we look at the trend the proportion has fallen as early as 2017 and remained at the same level in 2021 (Figure 44).
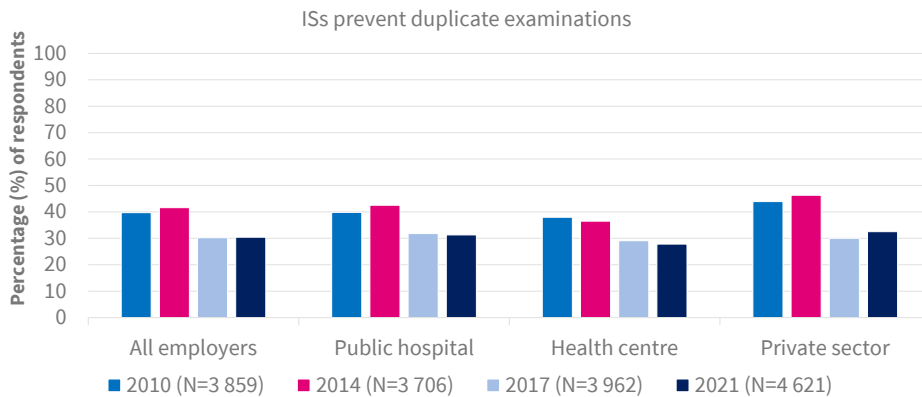
Figure 44. Proportion (%) of respondents agreeing or agreeing fully that information systems help to avoid duplicate tests and examinations. (THL Data base report).

One third (35%) of physicians agreed or agreed fully that information systems help in preventing errors and mistakes associated with medications. There was a decreasing trend among all employment sectors, and it seems that the health information systems ability to prevent medication errors has not improved at the last three measurement points (Figure 45).
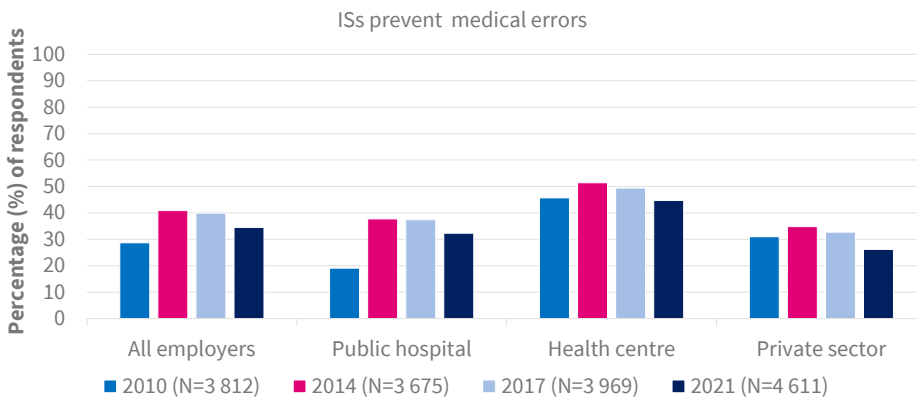
Figure 45. Proportion (%) of respondents agreeing or agreeing fully that information systems help in preventing errors and mistakes associated with medications. (THL Data base report).

One fifth (21%) of physicians agreed or agreed fully that information systems support complying with treatment recommendations (Figure 46). This may be partly due to the fact that, there is still further development in the integration of decision support and care path guidance systems. (Please see chapter 'Availability and use of e-health in Finland' that presents the results of survey for healthcare organizations in 2020.)

ISs support complying with treatment recommendations

■ 2014 (N=3 668)   ■ 2017 (N=3 956)   ■ 2021 (N=4 602)
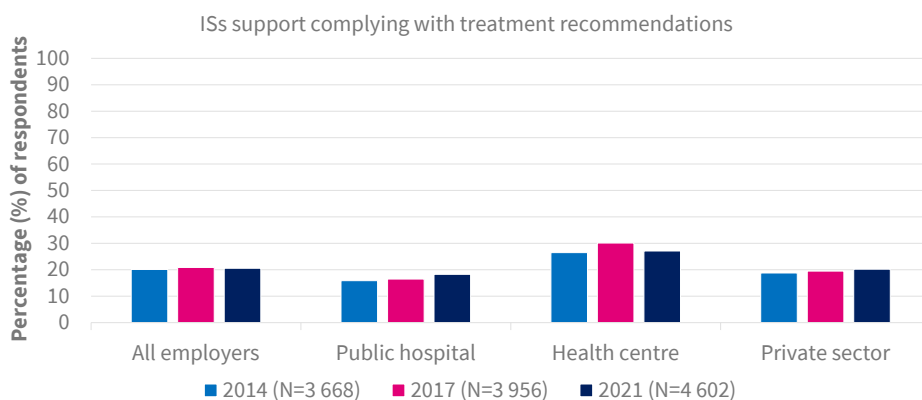
Figure 46. Proportion (%) of respondents agreeing or agreeing fully that information systems support complying with treatment recommendations. (THL Data base report)

Physician-patient collaboration

Tuulikki Vehko, Jarmo Reponen & Tarja Heponiemi

Improving data connections of professionals and citizens is one aim of the eHealth and eSocial Strategy 2020. The strategy was underway from 2014 to 2020 (STM 2014). Throughout all research years, one question assesses measures information systems (ISs) support for physician-patient collaboration in the questionnaire: 'How well do you consider that information systems support collaboration and information exchange between various parties? Between physicians and patients. The response scale was 'very well', 'fairly well', 'neither well nor poorly', 'rather poorly' and 'very poorly'. Measures depict proportion of physicians who answered very or fairly well.

Proportions of those physicians who agreed that ISs supports physician-patient collaborations have varied in different years, from 11% in 2014 to 25% in 2021. (Figure 47)
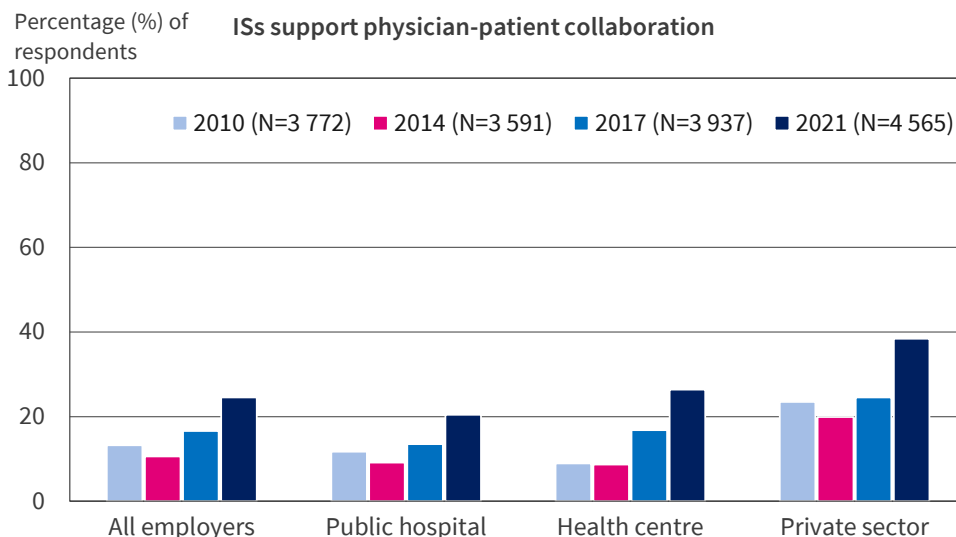
Figure 47. Proportion (%) of physicians that assessed that ISs supports physician – patient collaboration very or fairly well. (THL Data base report).

The proportions of physicians that consider that ISs supports physician-patient collaboration well varied according to the employment sector in 2021, the proportion (38 %) was the highest among private sector physicians and the lowest (20 %) among physicians working in public hospitals. Among physician working in health centre 26 % considers that ISs supports physician-patient collaboration well. In all those sectors, the proportions have increased compared to the earlier years, but remain at a low level. (THL Data base report). The fact that private sector physicians reported higher proportion compared to others, may be due to active role of private sector in developing e-services for their patients and also due to the nature of their services, direct patient contacts having a more prominent role than in the public sector. This finding strengthens the result of our previous report (Hyppönen et al. 2019).

In Finland e-services have been developed based on customers' needs especially in occupational health care (Karppi et al. 2021). Many of the customers in private sector are occupational health care services users and the working-aged population, in general, have the skills that are needed to use e-services (Kyytsönen et al. 2021). Based on this survey, we don't know if physicians have different requirements relating to IT ability to support physician-patient collaboration and whether it is related to the nature of their patient work. For example, the length of patient contacts may be short in services provided in hospital wards (hours, days) and long in primary care (weeks, months) in addition some specialised care polyclinics the length of patient contacts may be long. The length of the treatment relationship may be even years for a general practitioner and a patient with long-term illness if the responsibility for treatment of long-term illness is in a health centre. ISs mediated communication requirements

differ in these situations and physicians working in health centre may have higher requirements related to ISs support collaboration and information exchange between physicians and patients. In the future measurements it will be interesting to see whether patient portals that some public sector EHRs have just started to utilize appears in physiscians' assessments.

Physicians' participation in the health information system development

Susanna Martikainen, Johanna Viitanen, Tinja Lääveri

The respondents were asked about their experiences of participating in the development of health information systems (HISs) and providing feedback about their HISs.

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'.

Of all physicians who responded to the survey in 2021, 41 % agreed with the statement about knowing to whom and how they can send feedback about HISs. The same statement has been included in the surveys also in years 2010, 2014 and 2017 (Martikainen et al., 2020; Martikainen et al., 2012), percentage of the respondents who agreed were 47%, 42% and 39%, respectively (Figure 48). When comparing earlier surveys, the trend has been slightly decreasing from 2010 to 2017. The trend has reversed since in the latest survey (2021) slightly more (41%) physicians seemed to be aware of how to give feedback than in 2017 (39%).
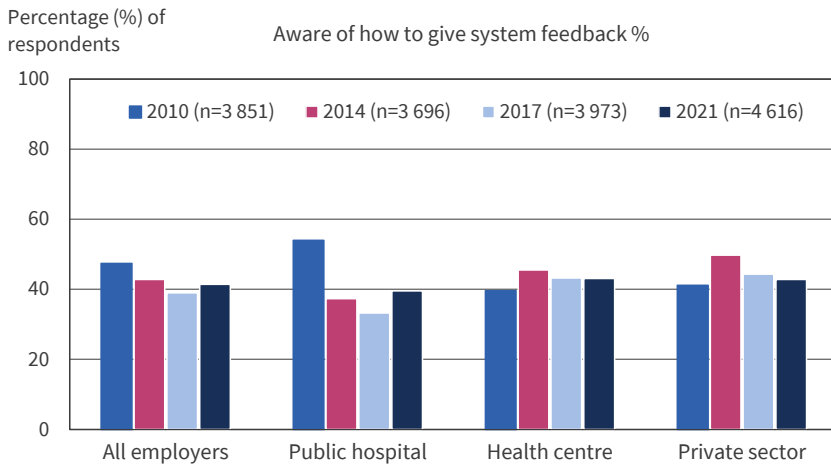
Figure 48. Proportion of physicians agreeing to be aware of how to give system feedback. (THL Data base report).

In 2021, 24% had participated in HIS development (Figure 49). Those working in public hospitals (28%) and health centres (17%) reported more participation than those working in the private sector (16%); this is readily explained by the complexity of the public healthcare HIS which require more end-user involvement, moreover, most private sector providers do not get compensated for development work. These figures are not comparable to the previous surveys, since the statement had changed. It is likely that those interested in HIS development are overrepresented among the respondents of this survey, but regardless a considerable proportion of physicians consider themselves having engaged in HIS development.
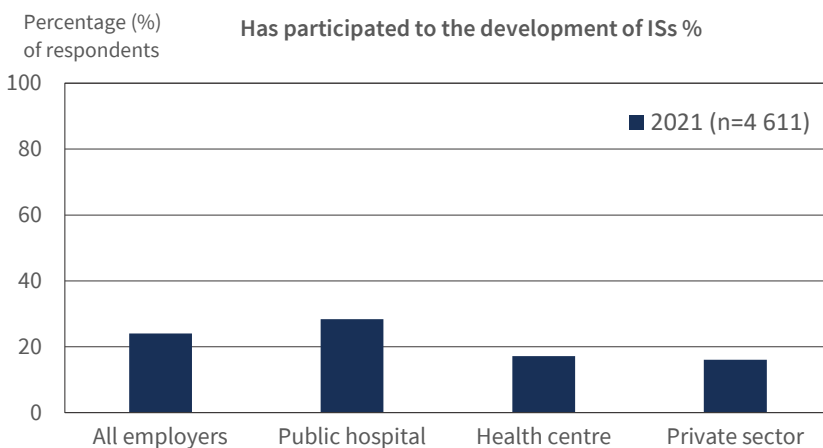
Figure 49. Proportion of physicians that have participated in information systems development work on work hours or after work. (THL Data base report)

Information system support for leadership and management

Tinja Lääveri & Jarmo Reponen

In the usability survey of 2021 for physicians, there was a separate section concerning Information system (IS) support for leadership and management. The respondents were directed to this section if they had replied having a leading/managerial position. The IS support was assessed by ten statements: (1) I have to collect information needed for management from several ISs. (2) I can use ISs to steer daily activity. (3) ISs facilitate measurement and monitoring of quality. (4) Available data support research, innovation and business activities. (5) ISs help me to monitor achieving the targets set by my unit (e.g. numbers of patients, periods of treatment, types of operations). (6) Follow-up data provided by the ISs are reliable and faultless. (7) ISs have helped to improve the efficiency of my unit in the last few years. (8) I can use ISs to follow the use of personnel, equipment, and room resources. (9) I use some ISs facilitating follow-up of activity every day. (10) It is easy to perform searches with the ISs used for following up activity.

In total, 787–809 responded to the statements. The results below are reported by the physician's working sector (public hospital, health centre, private sector) (Table 7). Most (77–82%) of the respondents replied that they had to put together the information needed for leadership and management purposes from several ISs. Reporting is useful only if the data are accurate and correct, however, only 15–19% of those working in public health centres and hospitals considered that the ISs provide reliable and error-free data, however, the respective figure among those working in the private sector was 32%. In the public health centres, the support for the management of daily activities was considered meagre: 26% agreed that ISs assist in steering daily activities, 26% replied that ISs support monitoring the achievement of targets, and 12% regarded that the ISs enable monitoring of resources. While the figures were slightly more positive among those working in public hospitals (33%, 37%, and 18%, respectively), the leading physicians working in the private sector had markedly more positive views (46%, 56%, and 35%). Further, 14% of those working in healthcare centres, 21% in hospitals and 41% in the private sector considered that ISs have improved the efficiency of their units over the past few years.

ISs are used for leading resources, operations, and quality. Nearly half (47%) of the physicians working in the private sector and 41% of those working in hospitals responded using these tools on a daily basis, which highlights the importance of these tools. By contrast, physicians working in healthcare centres reported less use (30%); than those working in hospitals (41%) or private sector (47%). this is readily explained by the lower availability of management IS tools in primary healthcare.

Only a small proportion (7–24%) of respondents considered conducting searches with the ISs easy. Since the leading physicians need to collect the data for leadership and management purposes from various sources (see above), it is likely that they have not been sufficiently trained to use the various ISs provided by their organizations. As it is unlikely that any single IS would cover all managerial/leadership needs (quality, planning of personnel, equipment and room resources, steering daily operations, strategic planning) of leading physicians in the near future, healthcare organizations should invest not only in training how to use these IS but also consolidating tools to minimize the number of ISs required for leadership and management.

Only a few public sector respondents (13% in hospital, 5% in healthcare centres) held the viewpoint that the available data in ISs support research, innovation and business activities. In the private sector this figure was a bit higher, 39%. This suggests that the public sector is not yet ready to use the full potential of data in shaping its future developments or collaboration with enterprises. Indeed, a recent survey suggests that the new Act on the Secondary Use of Health and Social Data has not reduced bureaucracy needed to obtain data for research (Reito et al 2022).

In general, the private sector appears to be more prepared to utilize the data it collects for leadership and management purposes than the public sector. This may be explained by its targeted service sector. By contrast, the public sector may suffer from the heterogeneity of its services. However, hospitals appear to have better capabilities to utilize the data than primary care, this is probably explained by their more advanced ISs, but also more active research and development activities. It is likely that the health and social services reform will - at least to some extent - decrease these differences within the public healthcare, as the regions are acquiring common ISs.

Table. 7. Per centage of respondents working in a public hospital, health centre or in the private sector in a managerial position who agreed with the statements concerning information systems' support for management. The numbers in abbreviated statements refer to the full statements mentioned in the chapter text.

		Public hospital (%)	Health centre (%)	Private sector (%)	All sectors (%)
1. Information must be collected from several information systems (ISs)	n=802	81	82	77	80
2. With ISs, I can steer daily activities	n=809	33	26	46	33
3. ISs facilitate monitoring the quality of activities	n=806	25	15	49	25
4. Available data supports research, innovation and business activities	n=790	13	5	39	14
5. ISs help me to monitor the targets set by my unit	n=800	37	26	56	37
6. The follow-up data produced by ISs is reliable and error-free	n=794	19	15	32	19
7. IS have helped to improve the efficiency of the unit	n=789	21	14	41	22
8. ISs provide a tool for monitoring the use of resources	n=789	18	12	35	18
9. I use ISs daily for activity monitoring	n=787	41	30	47	40
10. It is easy to perform searches with the activity monitoring systems	n=787	9	7	24	10

Supplementary material

Most of the results presented in this chapter can be viewed online using the dynamic database 'Electronic health record systems as physicians' tools in Finland'. (https://thl.fi/en/web/information-management-in-social-welfare-and-health-care/what-is-information-management-/follow-up-of-the-information-system-services-in-social-welfare-and-health-care/indicators-of-digitalisation/physicians-views-on-digitalisation). The database enables users to make their own selections from the materials e.g. respondents age group or experience with the information system.

References

Heponiemi, T, Hyppönen, H, Vehko, T, Kujala, S, Aalto, A, Vänskä, J, & Elovainio, M. (2017). Finnish physicians' stress related to information systems keeps increasing: A longitudinal three-wave survey study. Medical Informatics and Decision Making, 17, 1–8. doi: 10.1186/s12911-017-0545-y.

Heponiemi, T, Kujala, S, Vainionmäki, S, Vehko, T, Lääveri, T, Vänskä, J, Ketola, E. Puttonen S. Hyppönen, H. (2019). Usability factors associated with physicians' distress and information System–Related stress: Cross-sectional survey. JMIR Medical Informatics, 7(4). doi: 10.2196/13466.

Hyppönen, H, Kaipio, J, Heponiemi, T, Lääveri, T, Aalto, A.M, Vänskä, J, Elovainio, M. (2019) Developing the National Usability-Focused Health Information System Scale for Physicians: Validation Study. Journal of medical Internet research, 21(5), p.e12875. doi: 10.2196/12875.

Hyppönen, H, Lumme, S, Reponen, J, Vänskä, J, Kaipio, J, Heponiemi, T, Lääveri, T. (2019). Health information exchange in Finland: Usage of different access types and predictors of paper use. International Journal of Medical Informatics, 122, 1–6. https://doi.org/10.1016/j.ijmedinf.2018.11.005

Hyppönen H (2019) 'Usability of health information exchange and utility of systems' (p 115-121). In Book: Vehko T, Ruotsalainen S, Hyppönen H (eds.) E-health and e-welfare of Finland. Checkpoint 2018. National Institute for Health and Welfare (THL). 193 pages. Helsinki, Finland 2019. https://urn.fi/URN:ISBN:978-952-343-326-7

ISO 9241-11, International Standard ISO 9241. (1998). Ergonomic Requirements for Office Work with Visual Display Terminals, Part 11: Guidance on Usability, International Organization for Standardization, Geneve 1998.

Jormanainen V. (2018). Large-scale implementation and adoption of the Finnish national Kanta services in 2010–2017: a prospective, longitudinal, indicator-based study. Finnish Journal of EHealth and EWelfare, 10(4), 381–395. https://doi.org/10.23996/fjhw.74511

Jormanainen V, Reponen J. (2020). CAF and CAMM analyses on the first 10 years of national Kanta services in Finland. Finnish Journal of EHealth and EWelfare, 12(4), 302–315. https://doi.org/10.23996/fjhw.98548

Kaipio J, Lääveri T, Hyppönen H, Vainiomäki S, Reponen J, Kushnirukg A, Boryckig E, Vänskä J. (2017). Usability problems do not heal by themselves: National survey on physicians' experiences with EHRs in Finland. International journal of medical informatics 97, 266–281. https://doi.org/10.1016/j.ijmedinf.2016.10.010

Kaipio, J, Hyppönen, H, Lääveri, T. (2019). Physicians' experiences on EHR usability: A time series from 2010, 2014 and 2017. Studies in Health Technology and Informatics, 257, 194–199. https://doi.org/10.3233/978-1-61499-951-5-194

Kaipio, J, Kuusisto, A, Hyppönen, H, Heponiemi, T, Lääveri, T. (2020). Physicians' and nurses' experiences on EHR usability: Comparison between the professional groups by employment sector and system brand. International Journal of Medical Informatics, 134, 1–9. https://doi.org/10.1016/j.ijmedinf.2019.104018

Martikainen, S, Viitanen, J, Korpela, M, & Lääveri, T. (2012). Physicians' experiences of participation in healthcare IT development in Finland: willing but not able. International journal of medical informatics, 81(2), 98-113. https://doi.org/10.1016/j.ijmedinf.2011.08.014

Martikainen S, Kaipio J, Lääveri T. End-user participation in health information systems (HIS) development: Physicians' and nurses' experiences. (2020) International Journal of Medical Informatics. Vol. 137 1 – 11. https://doi.org/10.1016/j.ijmedinf.2020.104117

Reito A, Sanmark E, Tuovinen T, Seppälä TT, Kuitunen I, Ponkilainen V, Ekman E, Kauppila, JH. (2022) Toisiolaki – lääketieteellisen tutkimuksen mahdollistaja vai tukahduttaja? [Enabler or suppressor? – Survey on the effects of the Act on the Secondary Use of Health and Social Data on medical research.] Suomen Lääkärilehti [Finnish Medical Journal] 77(7-8):315. English summary available at: https://www.laakarilehti.fi/tieteessa/alkuperaistutkimukset/toisiolaki-laaketieteellisen-tutkimuksen-mahdollistaja-vai-tukahduttaja/ (Accessed 9.3.2022).

THL Data base report: Electronic health records as physicians' tools in Finland 2010, 2014, 2017 and 2021. Controller: The Finnish Medical Association; Partners: Finnish Institute for Health and Welfare, University of Oulu and Aalto University. https://sampo.thl.fi/pivot/prod/en/steps2/laakari/summary_tiiviste6

Vainionmäki, S, Aalto, A, Lääveri, T, Sinervo, T, Elovainio, M, Mäntyselkä, P, & Hyppönen, H. (2017). Better usability and technical stability could lead to better work-related well-being among physicians. Applied Clinical Informatics, 8(4), 1057–1067. DOI: 10.4338/ACI-2017-06-RA-0094

Vehko T, Ruotsalainen S, Hyppönen H (eds.) E-health and e-welfare of Finland. Checkpoint 2018. National Institute for Health and Welfare (THL). 193 pages. Helsinki, Finland 2019. (https://urn.fi/URN:ISBN:978-952-343-326-7)

Viitanen, J, Hyppönen, H, Lääveri, T, Vänskä, J, Reponen, J, Winblad, I. (2011) National Questionnaire Study on Clinical ICT Systems Proofs: Physicians Suffer from Poor Usability. International Journal of Medical Informatics 80(10), 708-725. https://doi.org/10.1016/j.ijmedinf.2011.06.010

Viitanen J, Tyllinen M, Tynkkynen E, Lääveri T. (2022) Usability of information systems: Experiences of outpatient physicians, outpatient nurses, and open care social welfare professionals from three large cross-sectional surveys in Finland, International Journal of Medical Informatics 165. https://doi.org/10.1016/j.ijmedinf.2022.104836.

Vänskä, J, Viitanen, J, Hyppönen, H, Elovainio, M, Winblad, I, Reponen, J, Lääveri, T. (2010) Lääkärien arviot potilastietojärjestelmistä kriittisiä. Suomen Lääkärilehti 50-52 (65) pp. 4177-4183. (In English: Doctors critical of Electronic Patient Record systems)

Registered nurses' experiences of electronic health records and client information systems

Kaija Saranto, Ulla-Mari Kinnunen, Maiju Kyytsönen, Tuulikki Vehko

Parallel to the development of the Finnish eHealth Strategy by the Finnish Ministry of Social Affairs and Health since 1995, it was obvious that a more detailed eHealth strategy for nursing would support the implementation of information systems from the nursing point of view. Despite numerous activities in eHealth and especially in nursing informatics (Saranto 1997, Saranto & Kinnunen 2021) the first eHealth Strategy was not published until 2015 (Ahonen et al. 2015) to support nurses' role in the information society. By updating the strategy in 2021, the aim was to increase the national debate on the role of nurses in developing and running digital services and strengthening public participation. The strategy is addressed to nurses, nurse entrepreneurs, service providers, and their partners in the health and social care sector, as well as to the partner associations of the Finnish Nursing Association (FNA) (Ahonen et al. 2021).

Working in a digital environment requires registered nurses to have competences related to these environments which vary depending on the specialty and digital services available. National digital health and social services are being actively developed and produced in Finland (Vehko et al. 2019). One of the most popular portals is the Kanta Services (please see chapter 'Finnish healthcare and social care system and ICT-policies'). At the time of this data collection and during the Covid-19 pandemic the components of the Kanta Services (the My Kanta Page, National e-prescription center, and the Patient data repository) were comprehensively and firmly in use. In general, health service providers guide patients to use My Kanta Pages to look at their laboratory test results as well as to follow the status of their prescriptions. Lately the services have been expanded, and citizens can have their immunization certification via My Kanta Page. From the registered nurses' point of view one of the most important services in Kanta is nursing discharge summary. The summary is available at the Patient data repository for patients and for professionals. (Kinnunen et al. 2021.)

In Finland, another important digital portal is the Health Village, which is a national service which is not restricted to the place of residence (www.digitalhealthvillage.com/en/home) and therefore the service improves the equality of citizens' access to health information and services. The Health Village concept also provides digital care pathways through a secure digital service channel for patients in care in specialized health care hospitals. The services in the Health Village portal were developed in

co-operation with the Virtual Hospital project by five Finnish university hospitals led by Helsinki University Hospital (Liljamo et al 2021). Digital care pathways rely on evidence-based medicine and nursing can benefit from the service, for example arrhythmia patients. For arrythmia patients a patient-centred development of a digital care pathway has been developed (Liljamo et al. 2020). Overall, a noticeable advantage of the Health Village is the willingness of citizens to use the services (Saranto et al. 2018). Besides the national digital services, different service providers or buyers (cities, regions, and municipal consortiums) offer their residents local e-services to take care of both social welfare and healthcare issues. Additionally, private sector organisations provide their own digital services (Kyytsönen et al. 2021) which are the part of digital environments for private sector nurses.

In general, the national eHealth and eSocial Strategy 2020 work involved several parties working together for the future services in social welfare and healthcare by improving information management. The strategy was implemented from 2014 to 2020, and the aims include several targets encapsulated in slogans such as 'Professionals- Smart systems for capable users'; 'Refinement of information and knowledge management – knowledge-based management' and 'Steering and cooperation in information management – from soloists to harmony' (Ministry of Social Affairs and Health 2015). Registered nurses' experiences of health and social care information systems were collected for the first time in 2017 (Hyppönen et al. 2018, Kinnunen et al. 2019a, b). The second survey to the registered nurses performed in 2020. Both surveys are part of the strategy monitoring. The purpose of this chapter is to describe nurses' overall satisfaction and frequency of daily logins to health information systems (HIS), and to examine the functionalities and challenges in HIS usage, as well as the benefits of HIS, support for patient information exchange, utility of the systems and usage of different modes of health information exchange. Additionally, the chapter describes the informatics competencies of nurses concerning HIS usage.

The HIS concept in this chapter refers to information systems for registered nurses both in health and social care. In this chapter we provide the state of the art in HIS use among registered nurses in 2020 referring to the national strategy (Ministry of Social Affairs and Health 2015).

Data collection

The origin of registered nurses' survey relates to the questionnaires tailored to physicians (Vänskä et al. 2010, Viitanen et al. 2011, Martikainen et al. 2012) as presented in the chapter 'Physicians' experiences of health information systems'. A compact presentation of the usability questions for physicians can be found in the National Usability-Focused Health Information System Scale (NuHISS) instrument (Hyppönen et al. 2019). The questions related to nursing documentation were developed for the 2017 questionnaire, and for the 2020 survey the statements were slightly

modified based on feedback from a pilot group of registered nurses. Altogether, the questionnaire has 44 mostly Likert style questions. Both questionnaires are available in Finnish at (https://thl.fi/fi/web/tiedonhallinta-sosiaali-ja-terveysalalla/tiedonhallin-nan-ohjaus/sote-digitalisaation-seuranta/sote-digitalisaation-seurantatutkimusten-to-teuttaminen). Ethical approval for the studies was provided by the Finnish Institute for Health and Welfare (THL).

The study design of the registered nurses' surveys was cross-sectional. The surveys were targeted working-age registered nurses, community nurses and midwives from the membership registers of the Nursing Association and the Union of Health and Social Care professionals in Finland (Tehy). In early 2017, a total of 3,607 nurses responded to the online survey (Hyppönen et al. 2018, Kinnunen et al. 2019a, b). In the spring 2020, a link to the survey was sent via email by the Finnish Nurses Association, Tehy and the National Professional Association for the Interests of Experts and Managers in Healthcare (TAJA) to their members under 66 years of age. Altogether 3,912 members responded. Of those who responded, 302 answered that they did not perceive themselves as fit to answer the questionnaire because they had not practiced nursing for a long time. Thus, the final sample included 3,610 respondents. The sample was representative of the eligible population regarding the employment sector (Saranto et al. 2020).

Registered nurses' overall satisfaction and frequency of daily logins into health information systems

The strategic objective at the national level in social welfare and healthcare is to improve the usability of the HISs, and that professionals should have access to information systems that support their work and its operating processes. Further, training of HIS should be offered and the development and update of HISs should be organized in cooperation with professionals and software developers. (Ministry of Social Affairs and Health 2015.)

The nurses were asked to give a school grade for the HIS that they mainly use. The scale was from 4 to 10, where 4 was the lowest score and 10 the highest score. Further, an option I cannot/do not want to give a grade) was used. Figure 50 presents the percentage of those who assessed their main HIS school grade from 8 to 10 (corresponding to good, very good or excellent). In 2017 one third (34%) and in 2020 a slightly higher proportion (41%) assessed their main HIS between 8-10. In 2020 slightly more nurses from health centres assessed their HIS between 8-10. The increase of respondents is the largest in the private sector. Nurses' expectations towards their main HIS have slightly increased between the study years of 2017 and 2020 but there is still room for improvement.

Percentage (%) of respondents
to the question

■ 2017 (n=2 701)   ■ 2020 (n=3 553)
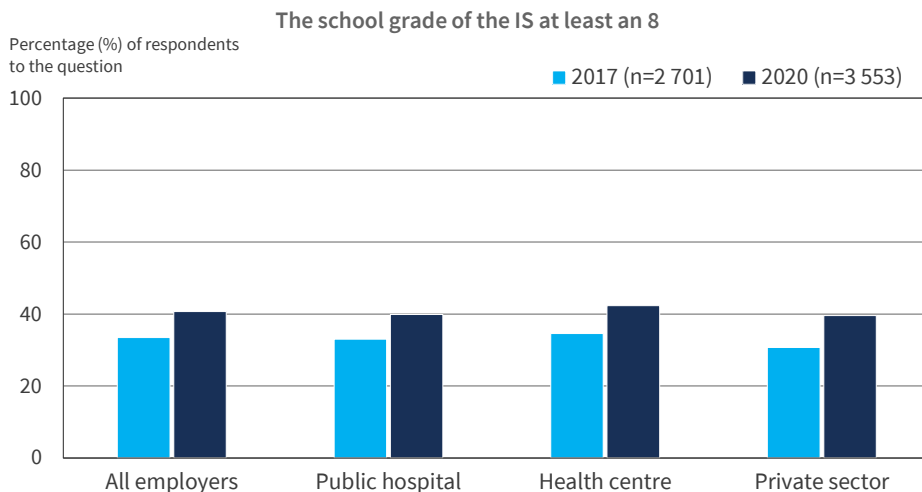
Figure 50. Percentage of nurses that assessed their main health record system or client information system to be good, very good or excellent (in a scale from 4 to 10) (2017 n=2,701, 2020 n=3,553)

Many logins into separate information systems have been reported to slow the work down and split the workflow, therefore registered nurses were asked 'How many information systems do you log in to daily when working with clients/ patients?' This refers to separate logins using a username or an ID card to systems, which are used to record patient data. The response scale was 0, 1, 2, 3, 4, 5 or more or 'I do not work with clients / patients'. More than a third of nurses reported that they signed into only one information system daily. There were no changes in the proportions between between the years when the surveys were conducted when looking at all employers. The biggest change can be seen in the private sector where in 2017, 55% of the respondents signed into only one system, but in 2020 the number had decreased (37%) (Figure 51). This might refer to the increased use of the Kanta services (Vehko et al. 2019).

Percentage (%) of respondents to the question

The users who sign in to only one IS daily %
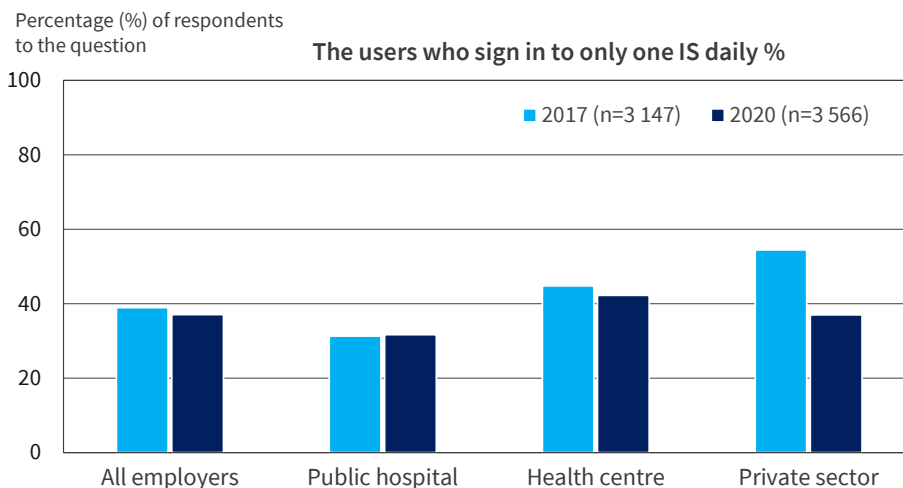
Figure 51. Percentage of registered nurses who signed in to only one information system daily (2017 n=3,147, 2020 n=3,566)

Functionalities and challenges in health information systems usage

The nurses assessed the use of the HIS functionalities according to three aspects, whether the system was technically stable, whether the system responded quickly to commands, and whether a faulty system function had caused an adverse event. The statements used in the survey were 'The system is stable in terms of technical functionality (does not crash, no downtime)'; 'The system responds quickly to inputs' and 'A faulty system function has caused a serious adverse event for a patient.' The response options differed between study years: in 2017, the response scale included 'fully agree', 'somewhat agree', 'neither agree nor disagree', 'somewhat disagree'and 'fully disagree'. In 2020, the response scale included the option 'I do not know' which was handled as missing information in the data.

In terms of the system's technical functionality, the situation was reported to have improved from 36% to 46%. Similarly, the overall assessment that system responds quickly to inputs improved from 34% to 45%. The proportion related to how well the system responded quickly to inputs were lowest in health centres compared to public hospitals or the private sector. The nurses' assessments of whether a faulty system function had caused an adverse event increased from 6% to 16% and the highest proportion (20%) occurred in public hospitals in 2020 (Figure 52).

The IS is technically stable %

The IS responds quickly to commands %

**Faulty system function has caused an adverse event %**
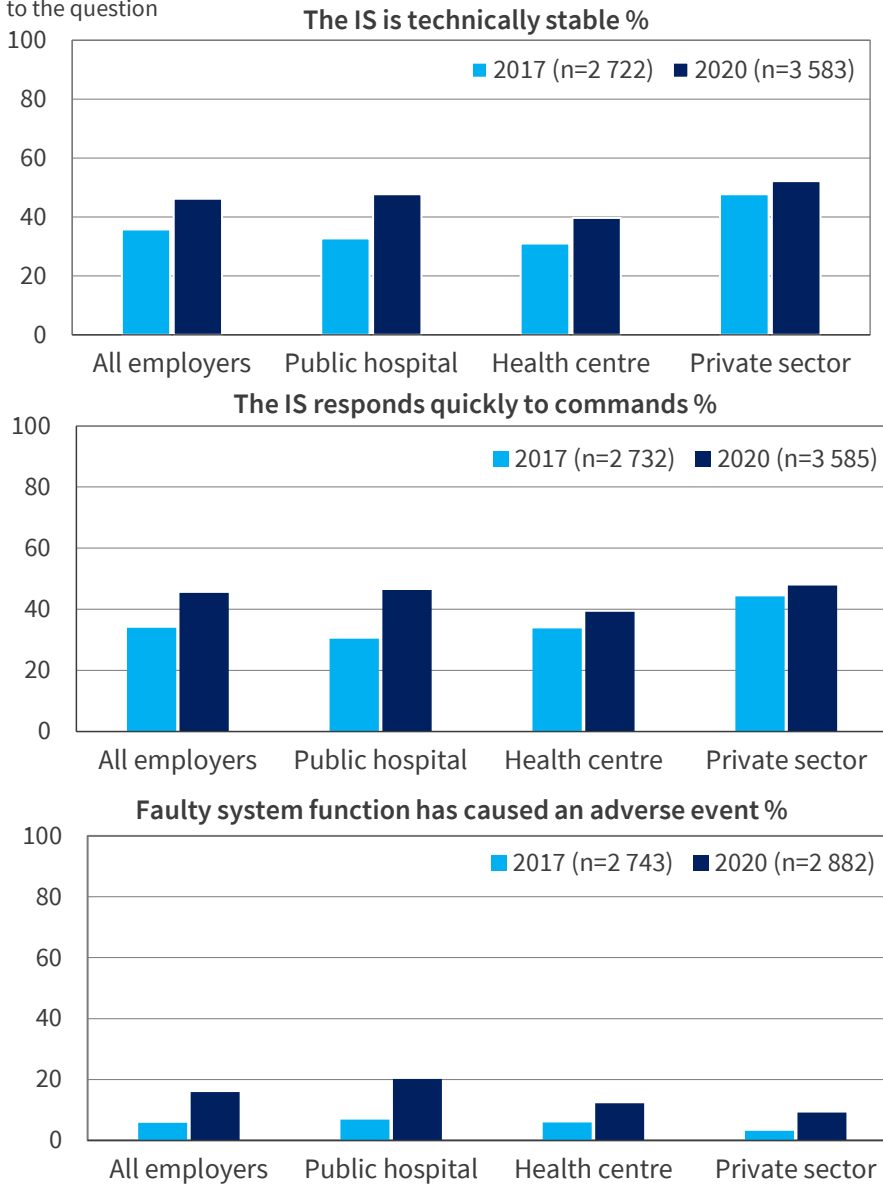
Figure 52. Percentage of nurses agreeing with the technical functionality statements concerning information systems: 'The information systems is technically stable %'; 'The information systems respond quickly to commands'; 'A faulty system function has caused an adverse event %'

In 2017, nurses were not as satisfied as physicians with the technical stability of the HIS which might be explained by the constant 24/7 HIS use by the nurses (Kaipio et al. 2020). For example, downtime disturbs and delays the tasks of nurses and might even endanger patient care. In this survey almost all the participants (94.6%) had experienced at least one ICT-related adverse event during the last 12 months. However, a majority of events were caused by human errors, not system malfunctions. The most typical adverse findings were related to medication lists or patient registrations (Kouvo et al. 2021).

The nurses assessed the ease of the use of the HIS with the following statements: 'It is easy to obtain necessary patient information using the information system.'; 'Routine tasks can be performed in a straightforward manner and without extra selections.'; 'Information documented into the nursing record is in an easily readable format.'; 'The terms of the client/ patient information system (e.g. names of functions and titles) are understandable.' and 'The arrangement of fields and functions is logical on computer screen.' A response scale 'fully agree', 'somewhat agree', 'neither agree nor disagree', 'somewhat disagree' and 'fully disagree' was used. In 2020, also the response option 'I do not know' was used and it has been handled as missing information in the data. Figure 53 presents the percentage of those who responded to fully or somewhat agree to these statements.

Half of the nurses fully or somewhat agreed that it was easy to obtain necessary patient information using the information system. The nurses' opinions on whether routine tasks were straightforward to perform remained similar in both surveys, at around two-fifths, in the data from 2017 and 2020. The assessment of whether nursing records were in an easily readable format increased slightly (from 49% to 55%). The assessment of whether the terminology was clear increased from 49% to 58%. Furthermore, the nurses were asked to assess whether the arrangement of fields and functions were logical on the computer screen and about half of the nurses agreed to the statement. The proportion was 46% in 2017 and 49% in 2020.
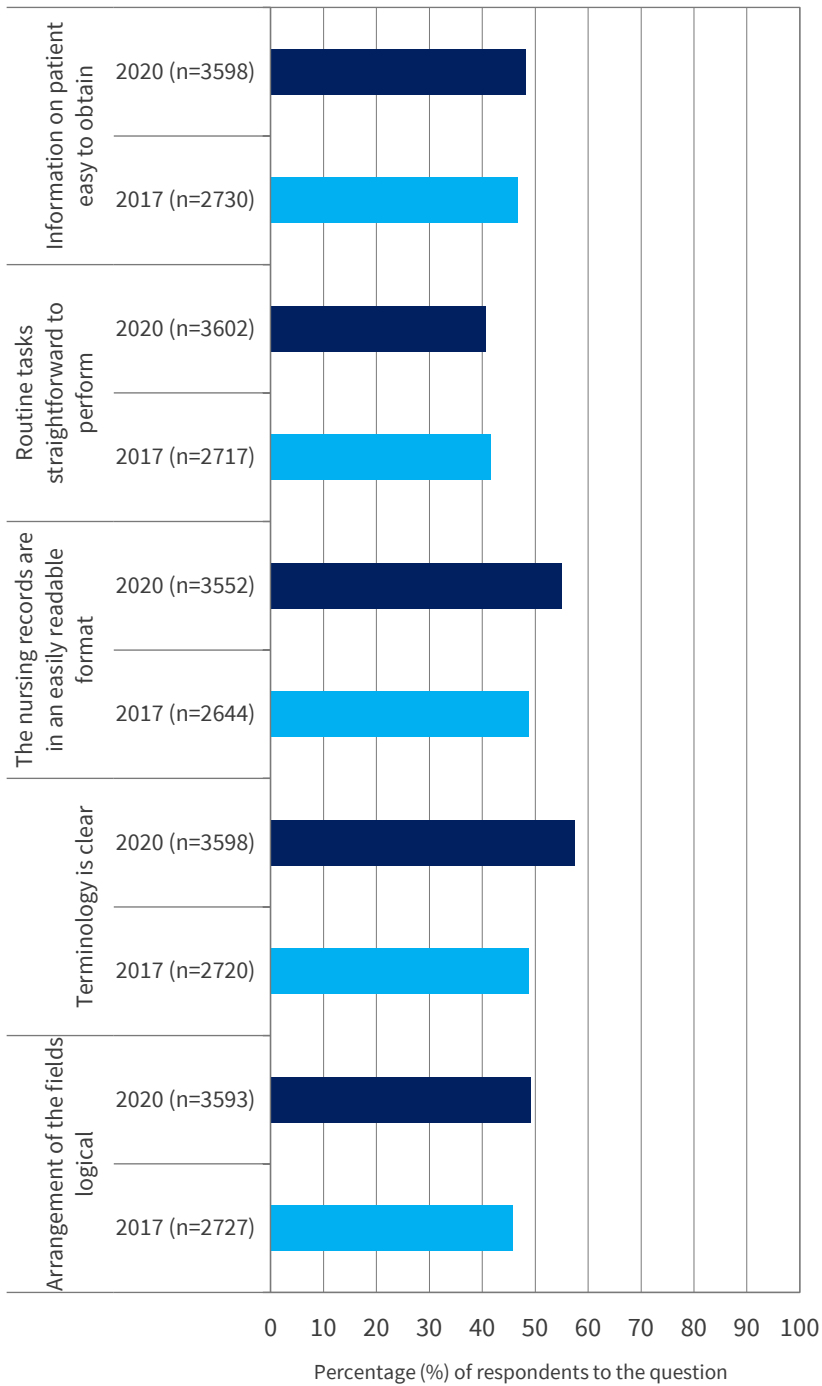
Figure 53. Percentage of nurses agreeing with the HIS ease of use statements

The results refer to slow improvements of the HISs and do not correspond to the national strategy, for example in the case of the availability of client/patient information and the aim to develop summaries and views for the use of professionals based on their job descriptions (Ministry of Social Affairs and Health 2015). Nurses commonly use HISs 24/7 depending on the work environment. Especially in such a treatment unit where patient care is fast and demanding, the HIS needs to be easy to use, supporting routine tasks and daily patient care documentation. Deficiencies in nursing records might have consequences endangering patient care (Kaihlanen et al. 2021b).

Benefits of health information systems

The registered nurses used the following statements to assess how HIS use supported carrying out their duties: 'Information systems help to improve the quality of care'; 'Information systems help to ensure the continuity of care'; 'Information systems help to prevent errors and mistakes associated with medication'; 'Information systems help to avoid duplicate tests and examinations'. The response scale was fully agree, somewhat agree, neither agree nor disagree, somewhat disagree, and fully disagree. In 2020 the respondents could also use the option 'I do not know' and this was processed as missing information in the data.

Slightly over half of the respondents reported that the HIS improved the quality of care. A small increase in 2020 was seen compared to 2017. Especially in the private sector the increase should be noted, from 54% to 64%. Two thirds of nurses stated that the HIS secured the continuity of care. There was a slight increase between the years when surveys were conducted in the private sector and health centres. In 2017, a third (37%) of registered nurses stated that the HIS prevented duplicate examinations, but the proportion increased to 47% in 2020. The increase can be seen in all sectors. A similar increase occurred concerning the statement 'Information systems prevent medical errors' (from 39% to 52%). A clear improvement from 2017 to 2020 was noticeable in all sectors (Figure 54).
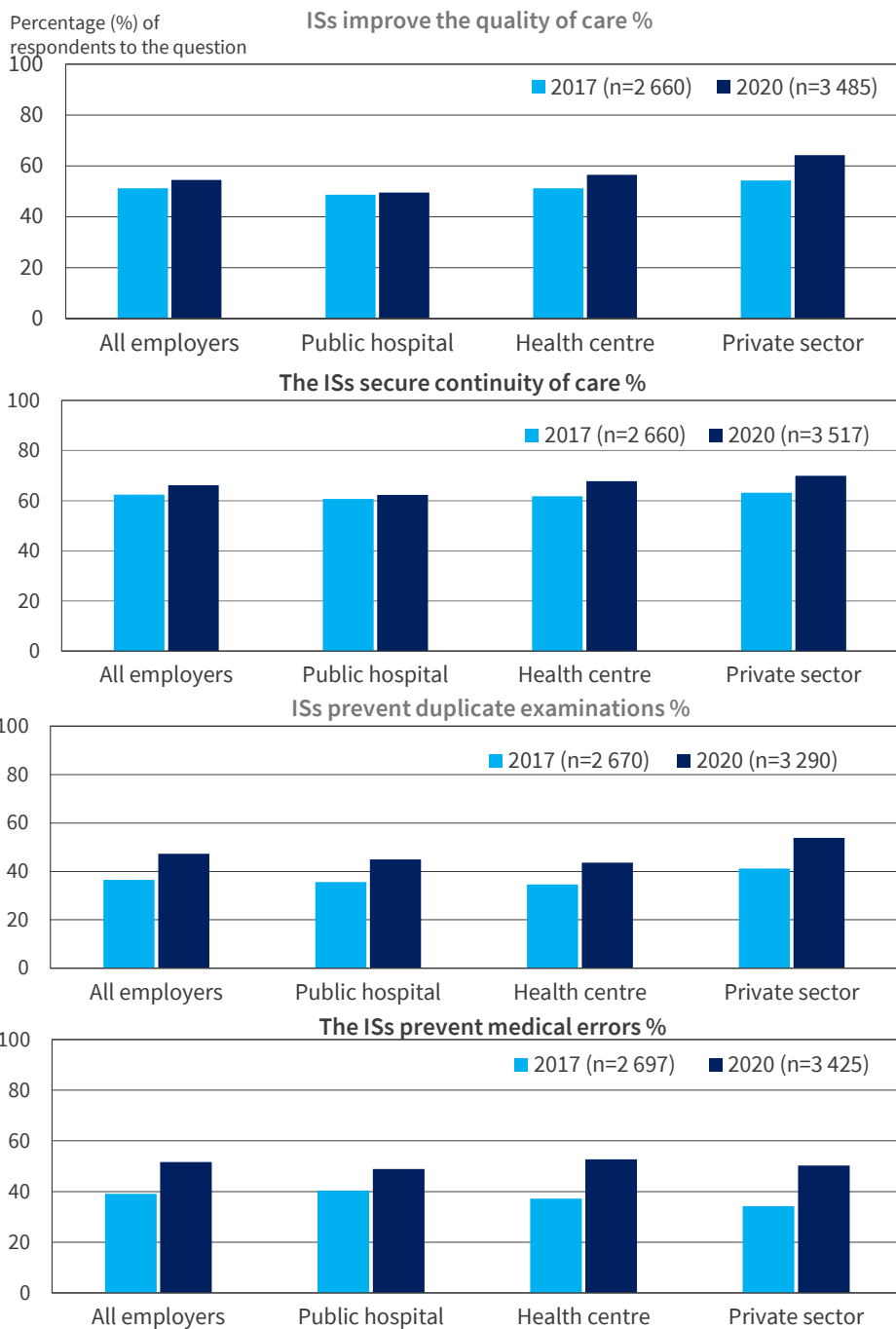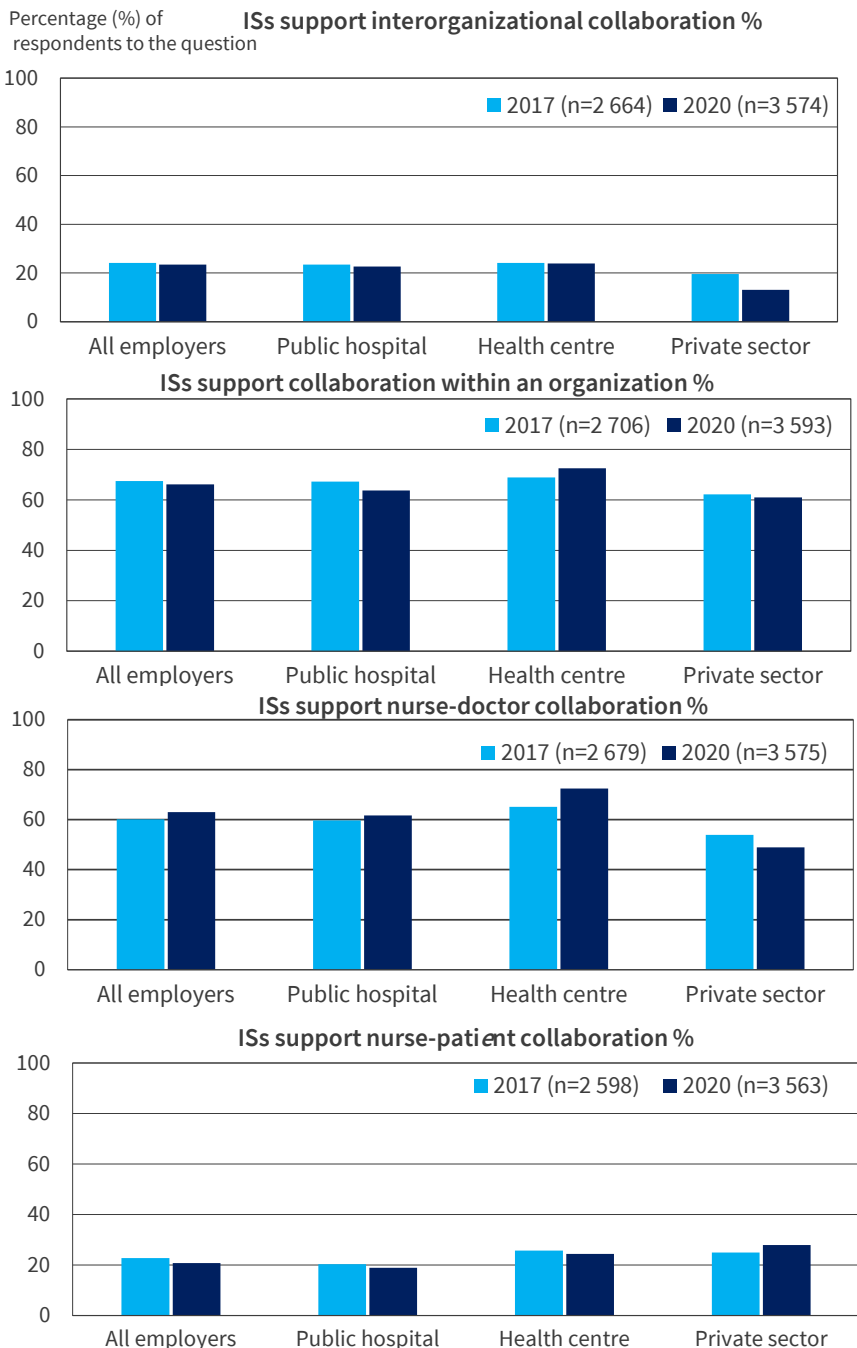
Figure 54. The percentage of nurses who agreed with statements concerning the benefits of information systems. The benefits concerned were 'Improving the quality of care', 'Securing the continuity of care', 'Preventing duplicate examinations' and 'Preventing medical errors'.

In 2017, 37% of physicians and 40% of nurses in hospitals agreed on the ability of HIS to avoid medical errors, whereas in health centres physicians (49%) were more satisfied compared to nurses (37%) (Kaipio et al. 2020). The benefits of the HIS are well recognized in the national strategies (Ministry of Social Affairs and Health 2015, Ahonen et al. 2021) even though in 2020 there still is room for improvement, it is important to follow the future development of these benefits. Overall, informatics support for nursing and healthcare, including ethics, economics, and interdisciplinary practice is a research topic suggested in a recent review (Saranto & Kinnunen 2021).

Support of patient information exchange and utility of systems

The registered nurses' experiences of the information exchange remained similar on both surveys. One-fifth of the registered nurses reported that the HIS supported interorganizational collaboration and two thirds evaluated that the HIS supported collaboration within an organization. About two thirds of registered nurses evaluated that the HIS supported nurse-doctor collaboration, but only one-fifth reported that the HIS supported nurse-patient collaboration. The proportions were mainly very similar in the various sectors regarding these statements (Figure 55).

In terms of HIS support for information exchange it seems that the greatest challenges concern interorganizational collaboration. This relates to system interoperability issues, which seem to improve only slowly. The other form of collaboration needing improvement is nurse-patient collaboration, which has not improved during the last years. However, the development of digital health services and the portal functionalities may improve the situation soon as seen in the following section in terms of the use of the Kanta services, while an alternative development could be that organizations may introduce various subsystems and apps with the aim of improving communication with the patient.

Figure 55. Support for patient information exchange and the utility of the HIS, percentage of nurses who agree that the information systems support collaboration in different levels 'ISs support interorganizational collaboration', 'ISs support collaboration within an organization', 'ISs support nurse-doctor collaboration', and 'ISs support nurse-patient collaboration'.

Information exchange is often connected to patient safety as crucial information does not always reach the next care facility (Saranto et al. 2021). Thus, the awareness of modes of collaboration attached to HIS usage is important. HIS support for patients or families, including empowerment, collaboration, and extension of the scope of health services needs more research evidence (Saranto & Kinnunen 2021).

Usage of different modes of health information exchange

One third of the registered nurses reported that they used paper documents or faxes when obtaining patient data. A slightly smaller proportion obtained patient data via a regional information system. Obtaining patient data via nationwide Kanta services slightly increased between the measurements' times (from 24% to 29%). In 2020, over a third (37%) of the private sector nurses were still using paper documents or faxes for data exchange. The use of a regional HIS (31%) and the Kanta services (50%) was the most common in health centres (Figure 56).
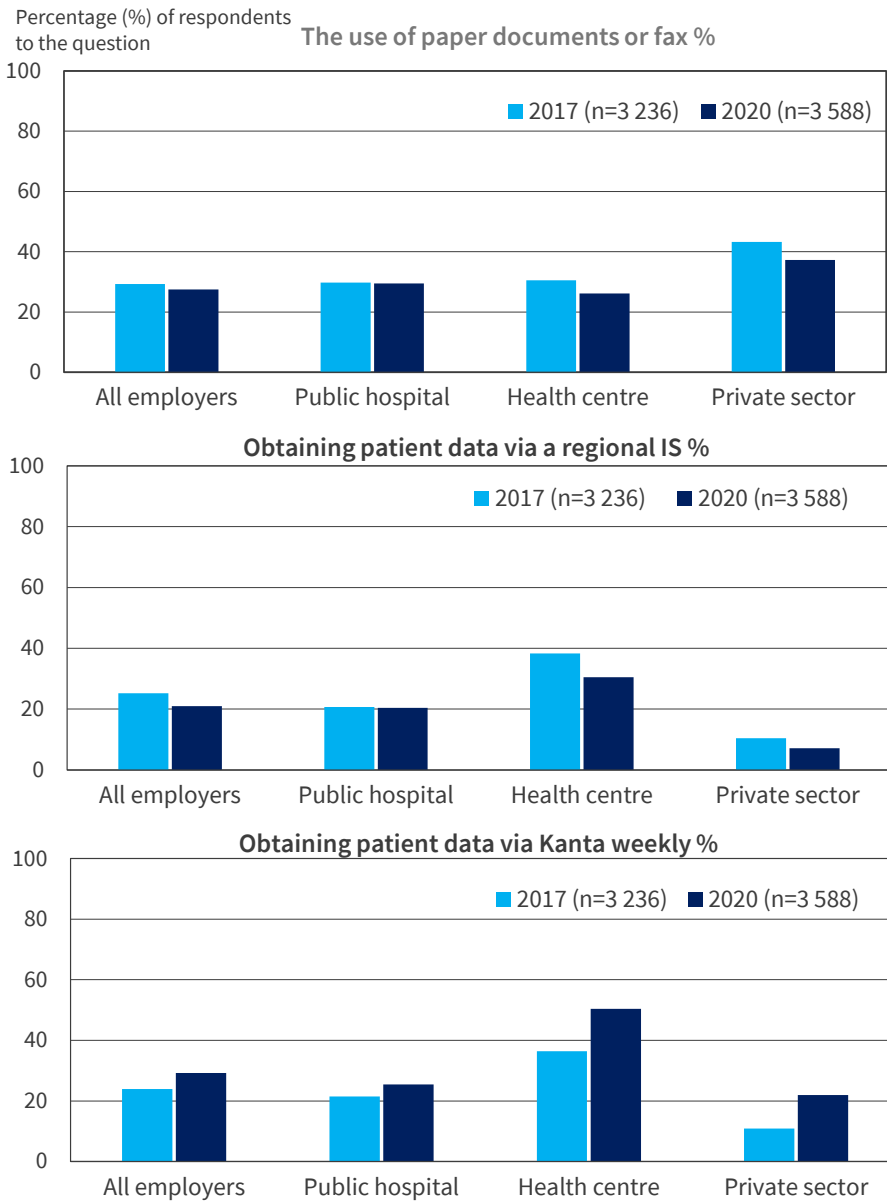
Figure 56. The proportion (%) of respondents using different modes of HIEs at least weekly (percentage of nurses who use means of information exchange at least weekly, 2017 n=3,236, 2020 n= 3,588). The figures show the percentages for: the use of paper documents or faxes; obtaining patient data via a regional IS; and obtaining patient data via the Kanta services weekly.

It is a little surprising that even though the HIS coverage has been 100% in the Finnish public healthcare system since 2010 (Reponen et al. 2019), the shift to totally electronic nursing documentation has not yet been fully realized. The 2017 survey of physicians also showed that paper documents are still used quite often for health information exchange. The results were strongly connected to the HIS and working environment (Hyppönen et al. 2019b). Regarding the nurses' use of the Kanta services, it may be that their use is affected because the daily nursing documentation is not stored in the Kanta service. However, nursing discharge summaries can be read on the Kanta services, which facilitates the continuity of care. The use of the Kanta services nationally and the nurses' experiences related to it should be monitored in the future.

Registered nurses' informatics competencies for health information system usage

The national strategy (Ministry of Social Affairs and Health 2015, Ahonen et al. 2021) highlights the informatics competencies of professionals in the social welfare and health sectors. The basic, advanced, and continuing education including workplace training of professionals needs to be well organized. Further, the aim is that nurses should be active and motivated HIS users, and therefore also responsible for assessing their competences in the use of HIS (Ahonen et al. 2021).

Standardized nursing documentation has been developed in Finland for over 20 years. The Finnish national nursing documentation model, which has been integrated into the HIS, consists of the nursing process, the nationally agreed structured core nursing data (nursing diagnosis, nursing interventions, nursing outcomes, nursing care intensity and nursing discharge summary) and the standardized terminology of the Finnish Care Classification (FinCC). The nursing discharge summary, which is electronically available for both, patients and professionals, is stored in the patient data repository as part of the Kanta service (Kinnunen et al. 2021).

In the 2020 survey, nurses were asked to assess their nursing informatics competencies by using a multichoice question: 'How well do you feel you have mastered the following skills required by information systems?'. The 17 items included and grouped into three separate dependent variables 'Nursing documentation', 'Digital environment' and 'Ethics and data protection' are summarized in Table 8.

Table 8. Items (n=17) related to nursing informatics competencies in the 2020 survey

Nursing documentation
Documentation of patient care according to the nursing process
Documentations in the HIS
Documentation of nursing diagnosis (FiCND)
Documentation of the aims of the planned care
Documentation of planned nursing interventions (FiCNI)
Documentation of nursing interventions (FiCNI)
Documentation of the assessment of patient outcomes (FiCNO)
Documentation of patient care intensity
Documentation of nursing discharge summary
Working in a digital environment
Basic Information Technology (IT) skills
Use of clinical guidelines and other research skills at work
Supporting the patient to take advantage of the potential of electronic self-assessment and self-care
Supporting the patient to choose the most appropriate service
Work in the digital healthcare environment
The development of eHealth services in multiprofessional collaboration with the patient and other stakeholders
Ethics and data protection
Compliance with data protection and data security principles in daily work
Application of the ethical rules in eHealth services

FiCND= Finnish Classification of Nursing Diagnoses;

FiCNI= Finnish Classification of Nursing Interventions;

FiCNO= Finnish Classification of Nursing Outcomes

Erratum 13.3.2023 (scale: excellently=4, well=3, satisfactorily=2, passably=1, My organization does not require this skill)

Based on the nurses' responses ~~(scale: very well = 1, well = 2, sufficiently = 3, passably = 4, my organization does not require having the skill = 5)~~ competencies in ethics and data protection were at a very good level (n=3,089, mean 3.06, standard deviation 0.68). By contrast, skills in nursing documentation (n=3,124, mean 2.78,

standard deviation 0.63) and working in a digital environment (n=3,122, mean 2.58, standard deviation 0.65) show urgent need for improvement.

In 2017, nurses assessed their informatics competencies in general to be relatively high (Kinnunen et al. 2019b). In the assessment, the 16 statements were grouped in four domains: 1) terminology-based (FinCC) documentation, 2) patient-related digital work, 3) general IT competency, and 4) electronic documentation according to structured national headings. The results of the two data collections cannot straightforwardly be compared because the clarity and exactness of the questions has been enhanced. Additionally, a new item "Documentations in the HIS" was included in the 2020 survey. However, according to the nurses' responses in both, 2017 and 2020, general IT competencies including for example, ethical rules, data security and data protection issues, were at a fairly good level. This seems to correspond to national objectives (Ministry of Social Affairs and Health 2015). Nurses' skills demanded by the digital patient care paths (Ylilehto et al. 2019, Kujala et al. 2020, Liljamo et al. 2020) need to be taken into consideration. For instance, the education and training of nurses does not go hand in hand with the rapid development of digital social and healthcare services. Even though the standardized terminology-based documentation is widely used in Finnish healthcare organisations (Kinnunen et al. 2021), its usage and training does not cover all hospitals (Kaihlanen et al. 2021a), and that is why the competency related to nursing documentation is not at a good level within all the responses. In the 2017 survey, there were differences between the HISs in use (Kinnunen et al. 2019) and working environments (Kaihlanen et al. 2021a). Thus, constant training and assessment of the need for education as well as managerial support are needed.

Summarising the findings related to the national eHealth and eSocial Strategy 2020 goals

The following statements related to the national eHealth and eSocial Strategy 2020 have been published in Finnish (Saranto et al. 2021). With regard to the sub-objectives of the strategy, the following can be said based on this survey.

The statement 'Professionals in social welfare and health care have access to information systems that support their work and its operating processes' is partially realized. Kanta services support the flow of information, but the use of the services in all operating environments must be encouraged. Guidance of patients and customers in the use of Kanta services is also limited. It takes a lot of effort to get information from another organization, and notifications provided by information systems were not perceived to be useful.

The second statement was: 'The professionals' competence in information management is strengthened, and effective workplace training is provided for the adoption of new applications as concerns both the information systems and the operating

models used'. This was seen to be partially realized. Registered nurses have good competencies to use health information systems, but in-service training is needed to support the changes in work processes related to digital services.

The efforts that systems will improve the quality and meaningfulness of the work are partially realized. Registered nurses assessed that continuity of care, care quality and patient safety are key areas of advantages that information systems already provide. Respondents expressed doubts about the functionalities of the systems to compile summary views.

Supplementary material

Some of the results presented in this chapter can be viewed online using the dynamic database 'Nurses' experiences of electronic health records and client information systems'. The database enables users to make their own selections from the materials e.g. respondents age group or experience with the information system. (https://thl.fi/en/web/information-management-in-social-welfare-and-health-care/what-is-information-management-/follow-up-of-the-information-system-services-in-social-welfare-and-health-care/indicators-of-digitalisation/nurses-views-on-digitalisation).

References

Ahonen O, Kouri P, Liljamo P, Granqvist H, Junttila K, Kinnunen U-M, Kuurne S, Numminen J, Salanterä S, Saranto K (2015). eHealth strategy of the Finnish Nurses Association 2015–2020. Accessed March 10, 2022.

Ahonen O, Kouri P, Salanterä S, Liljamo P, Kinnunen U-M, Saranto K, Numminen J, Aho-Konttinen A, Herukka A, Zewi-Kalliomaa C (2021). Finnish Nurses Association's Digital Social and Health Services Strategy. Available: https://www.nurses.fi/@Bin/304203/E-health%202021.pdf Accessed March 10, 2022.

Gluschkoff K, Kaihlanen A-M, Palojoki S, Laukka E, Hyppönen H, Karhe L, Saranto K, Hepojoki T. (2021). Reporting of health information technology system-related patient safety incidents: The effects of organizational justice. Safety Science 144. https://doi.org/10.1016/j.ssci.2021.105450

Heponiemi T, Kaihlanen A-M, Gluschkoff K, Saranto K, Nissinen S, Laukka E, Vehko T. (2021). The Association Between Using a Mobile Version of an Electronic Health Record and the Well-Being of Nurses: Cross-sectional Survey Study. JMIR Med Inform 2021;9(7):e28729) doi: 10.2196/28729.

Hyppönen, H, Lääveri, T, Hahtela, N, Suutarla, A, Sillanpää, K, Kinnunen, U.-M, Ahonen, O, Rajalahti, E, Kaipio, J, Heponiemi, T, & Saranto, K. (2018). Smart systems for capable users? Nurses' experiences on patient information systems 2017. FinJeHeW, 10(1), 30–59. https://doi.org/10.23996/fjhw.65363

Hyppönen, H, Kaipio, J, Heponiemi, T, Lääveri, T, Aalto, A.M, Vänskä, J, Elovainio, M. (2019) Developing the National Usability-Focused Health Information System Scale for Physicians: Validation Study. Journal of medical Internet research, 21(5), p.e12875. doi:10.2196/12875

Hyppönen, H, Lumme, S, Reponen, J, Vänskä, J, Kaipio, J, Heponiemi, T, & Lääveri, T. (2019b). Health information exchange in Finland: Usage of different access types and predictors of paper use. International Journal of Medical Informatics, 122, 1–6. https://doi.org/10.1016/j.ijmedinf.2018.11.005

Kaihlanen A-M, Gluschkoff K, Kinnunen U-M, Saranto K, Ahonen O, Heponiemi T. (2021a). Nursing informatics competences of Finnish registered nurses after national educational initiatives: A cross-sectional study. Nurse Educ Today. 2021 Nov;106:105060. doi: 10.1016/j.nedt.2021.105060. Epub 2021 Jul 20.

Kaihlanen A-M, Gluschkoff K, Saranto K, Kinnunen U-M. (2021b). The associations of information system's support and nurses' documentation competence with the detection of documentation-related errors: Results from a nationwide survey. Health Informatics J. Oct-Dec 2021;27(4):14604582211054026. doi: 10.1177/14604582211054026.

Kaipio J, Kuusisto A, Hyppönen H, Heponiemi T, Lääveri T. Physicians' and nurses' experiences on EHR usability: Comparison between the professional groups by employment sector and system brand. Int J Med Inform. 2020 Feb; 134:104018. https://doi: 10.1016/j.ijmedinf.2019.104018.

Kinnunen U-M, Hyppönen H, Liljamo P, Saranto (2019a). Nurses' experiences of health and social care information systems. Pages. 130-147. In Vehko T, Ruotsalainen S, Hyppönen H. (eds.) E-health and e-welfare of Finland. Check Point 2018. National Institute for Health and Welfare (THL). 2019. https://urn.fi/URN:ISBN:978-952-343-326-7

Kinnunen Ulla-Mari, Heponiemi Tarja, Rajalahti Elina, Ahonen Outi, Korhonen Teija, Hyppönen Hannele. (2019b) Factors Related to Health Informatics Competencies for Nurses - Results of a National EHR Survey. Comput Inform Nurs. 2019 Aug;37(8):420-429. doi: 10.1097/CIN.0000000000000511.

Kinnunen U-M, Liljamo P, Härkönen M, Ukkola T, Kuusisto A, Hassinen T, Moilanen K. The Finnish Care Classification System, FinCC 4.0 – Use Guide. Finnish Institute for Health and Welfare. 2021. https://www.julkari.fi/handle/10024/140289. Accessed March 22, 2022.

Kouvo J, Koponen S, Kuusisto H, Saranto K. (2020). Health Professionals' Perceptions and Reactions to ICT-Related Patient Safety Incidents. In Värri al. (Eds.) Integrated Citizen Centered Digital Health and Social Care. 2020 The European Federation for Medical Informatics (EFMI) and IOS Press. Studies in Health Technology and Informatics 275, 102-106. doi:10.3233/SHTI200703

Kujala S, Ammenwerth E, Kolanen H, Ervast M. Applying and Extending the FITT Framework to Identify the Challenges and Opportunities of Successful eHealth Services for Patient Self-Management: Qualitative Interview Study. J Med Internet Res 2020;22(8):e17696. https://doi: 10.2196/17696.

Kyytsönen M, Hyppönen, H, Koponen, S, Kinnunen, U-M, Saranto, K, Kivekäs, E, Kaipio, J, Lääveri, T, Heponiemi, T, Vehko, T. (2020). Tietojärjestelmät sairaanhoitajien työn tukena eri toimintaympäristöissä: kokemuksia tuotemerkeittäin. [In Finnish with astract in English: Information systems as supporters of nurses' work: experiences by system brand.] FinJeHeW, 12(3): 250 -269. https://doi.org/10.23996/fjhw.95704

Kyytsönen M, Aalto A-M, Vehko T. (2021) Sosiaali- ja terveydenhuollon sähköinen asiointi 2020–2021: Väestön kokemukset. (In Finnish with abstract in English: Social and health care online service use in 2020–2021: Experiences of the population.) Finnish Institute for Health and Welfare (THL). Report 7/2021. 66 pages. Helsinki 2021. (https://urn.fi/URN:ISBN:978-952-343-680-0)

Liljamo P, Säilynoja H, Tuomikoski K, Henner A, Koivunen K. Patient-Centered Development of a Digital Care Pathway for Arrhythmia Patients. Stud Health Technol Inform. 2020;275:127-131. https://doi.org/10.3233/SHTI200708.

Liljamo P, Wahlberg J, Mikkonen H, Reponen J. A Digital Care Pathway to Access Healthcare Without Time and Place Restrictions. Stud Health Technol Inform. 2021 Dec 15;284:163-165. doi: 10.3233/SHTI210690. PMID: 34920495. https://ebooks.iospress.nl/doi/10.3233/SHTI210690

Martikainen, S, Viitanen, J, Korpela, M, & Lääveri, T. (2012). Physicians' experiences of participation in healthcare IT development in Finland: willing but not able. International journal of medical informatics, 81(2), 98-113. DOI: 10.1016/j.ijmedinf.2011.08.014

Ministry of Social Affairs and Health. Information to support well-being and service renewal. eHealth and eSocial Strategy 2020. Helsinki, Finland: Edita Prima; 2015. Available: http://urn.fi/URN:ISBN:978-952-00-3575-4 Read March 10, 2022.

Reponen J, Kangas M, Hämäläinen P, Haverinen J, Keränen N. Availability and use of e-health in Finland. In: Vehko T, Ruotsalainen S, Hyppönen H. (eds.) E-health and e-welfare of Finland. Check Point 2018. National Institute for Health and Welfare (THL). 2019. https://urn.fi/URN:ISBN:978-952-343-326-7

Saranto K. (1997) Outcomes of Education in Information Technology - towards a Model of Nursing Informatics Education. Annales Universitatis Turkuensis. Ser D 275 Medica -Odontologica. University of Turku, Finland.

Saranto K, Kinnunen U-M. (2021). Applied Informatics Research in Nursing for eHealth. In Hussey P, Kennedy M.A. (eds) Introduction to Nursing Informatics. Health Informatics. Springer, Cham. https://doi.org/10.1007/978-3-030-58740-6_13

Saranto K, Kivekäs E, Kuosmanen P, Kinnunen U-M. (2018). Electronic Health Services in the Patients' Daily Activities – Willingness to Use Health Village Services. In Ugon A, Karlsson D, Klein G.O, Moen A. (eds.) Building Continents of Knowledge in Oceans of Data: The Future of Co-Created eHealth. IOS Press, Amsterdam, Studies in Health Technology and Informatics 247, 586-590.

Saranto, K, Kinnunen, U-M, Koponen, S, Kyytsönen, M, Hyppönen, H, Vehko, T. (2020). Sairaanhoitajien valmiudet tiedonhallintaan sekä kokemukset potilas- ja asiakastietojärjestelmien tuesta työtehtäviin. [In Finnish with abstract in English: Nurses' competences in information management as well as experiences in health and social care information system support for daily practice] FinJeHeW, 12(3), 212–228. https://doi.org/10.23996/fjhw.95711

Saranto K, Koponen S, Kivekäs E, Vehko, T. (2021). Käyttökokemusarvioita sairaanhoitajan näkökulmasta asiakas- ja potilastietojärjestelmistä sosiaali- ja terveydenhuollon yhteisissä palveluissa ja yleensä terveydenhuollossa. [In Finnish with abstract in English: Assessments of nurses' experiences of patient and client information system usage in joint health care and social welfare services and overall in health care] FinJeHeW, 13(4), 332–346. https://doi.org/10.23996/fjhw.109932

Viitanen, J, Hyppönen, H, Lääveri, T, Vänskä, J, Reponen, J, Winblad, I. (2011). National Questionnaire Study on Clinical ICT Systems Proofs: Physicians Suffer from Poor Usability. International Journal of Medical Informatics 80(10), 708-725. DOI: https://doi.org/10.1016/j.ijmedinf.2011.06.010

Vehko T, Ruotsalainen S, Hyppönen H (eds.) E-health and e-welfare of Finland. Checkpoint 2018. National Institute for Health and Welfare (THL). 193 pages. Helsinki, Finland 2019. https://urn.fi/URN:ISBN:978-952-343-326-7

Vänskä, J, Viitanen, J, Hyppönen, H, Elovainio, M, Winblad, I, Reponen, J, Lääveri, T. (2010). Lääkärien arviot potilastietojärjestelmistä kriittisiä. [English summary: Doctors critical of electronic patient record systems.] Suomen Lääkärilehti 65, 4177-4183.

Ylilehto MH, Saarivesi E, Reponen J, Liljamo P. Combining end-user recruitment methods for usability testing of eTriage Service. FinJeHeW. 2019;11:311-319. https://doi.org/10.23996/fjhw.82596.

Social welfare professionals' experiences of client information systems

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Monitoring the experiences of social welfare professionals with client information systems (CISs) is necessary in the digital transformation of the social service systems. Digitalization is one of the most significant developments that have changed human society, infiltrating almost all human activity. In social welfare and healthcare, digitized technology has pervaded and changed the entire service delivery system, the way professionals work and provide services for clients, and the ways of producing, sharing and archiving information (Ministry of Social Affairs and Health, 2015; Jormanainen & Reponen, 2020; Steiner, 2021; Breit et al., 2021). Successful adoption of technologies such as CISs requires thorough planning from organizations and new digital competences from professionals (Kujala et al., 2018; Zhu & Andersen, ahead-of-print).

As essential tools for social welfare professionals, CISs should offer support for different aspects of daily work including: case work, administrative tasks, effectiveness and knowledge formation, coordination of multi-professional networks, and knowledge management (Lavié & Fernandez, 2018; Ylönen et al., 2020; Salovaara, 2021). Furthermore, CISs are expected to enable information retrieval and sharing, enable comprehensive case-based knowledge formation and support decision-making at every level of the organization (Fitch, 2018; Zhu & Andersen, 2021; Salovaara & Ylönen, 2021). If the CIS does not meet the practical needs of social welfare professionals, there are risks of workarounds and inconsistent use of the CIS, compromised data reliability, and use of paper-based or spreadsheet documentation alongside the CIS. This may even endanger data security (Huuskonen & Vakkari, 2013; Salovaara 2021). An unsatisfactory and impractical CIS can waste valuable resources and cause stress (Shaw et al., 2009; Breit et al., 2021). A study of nurses demonstrated that perceived stress related to information systems is highest among those who have gone through an electronic health record (HER) implementation within the last 6 months (Heponiemi et al., 2021).

The emphasis on administrative perspectives in the development of CISs has led to very rigid workflows, which appear to conflict with the end users' needs (Gillingham, 2013; Koskinen, 2014; De Witte et al., 2016). To better meet the requirements arising from practical work, CISs should be developed by engaging professionals in the design and implementation processes (Barfoed, 2019; Martikainen et al., 2021). The digital competence of social welfare professionals needs also to be strengthened by ensuring that basic and continuing professional education meet the needs of digital work (Zhu & Andersen, ahead-of-print; McInroy, 2021; Steiner, 2021; Nadav et al.

2021). Fortunately, as the general attitudes of social welfare professionals towards technology appear positive, they are willing to participate in CIS development and are experienced users of CISs. (Barrera-Algarín et al., 2021; Martikainen et al., 2021; Salovaara et al., 2022). This creates favourable conditions for future development and remedying the previous challenges experienced regarding CISs in social welfare.

In this chapter, the results of a national survey of social welfare professionals' experiences of CISs are presented. The experiences are viewed from the perspective of CIS usability, information retrieval and exchange, participation in development and support for knowledge-based management. The results are presented by comparing the experiences of public sector employees with those working in the private or third sector. The first pilot survey among social welfare professionals was conducted in 2019 (Ylönen et al., 2020; Martikainen et al., 2021), however, this is the first time a national survey with social welfare professionals was carried out as part of the Monitoring and assessment of social welfare and healthcare information system services 3.0 project (STePS 3.0) (Salovaara et al., 2022).

Methodology and data

This national cross-sectional survey was targeted at social welfare professionals who were educated at university or universities of applied sciences and explored their experiences of using CISs. The survey was based on the pilot survey in the year 2019 designed by a multidisciplinary team and coordinated by Aalto University (Ylönen et al., 2020). The survey statements were modified from the usability-focused surveys for physicians in 2010-2021 (Vänskä et al., 2010) and the National Usability-Focused Health Information System Scale (NuHISS) instrument (Hyppönen et al., 2019). On the basis of the pilot study and expert assessment, the statements were updated for the STePS 3.0 survey.

Data collection started on September 1st 2020 and was carried out using Webropol 3.0. Emails with cover letter and instructions were sent to all working-age social welfare professionals under 65 years of age who were members of Talentia Union of Professional Social Workers, the Trade Union for the Public and Welfare Sectors, or the the Social Science Professionals association (n=12,471). As the email addresses of some members were incomplete, the data collection was extended until October 15th, and the survey invitations were also distributed via social media (Salovaara et al., 2022).

The final number of respondents was 990. Almost all (94%) were licensed social welfare professionals and were working in the public sector (86%). This chapter provides background information for reviewing results in open database reports (summaries and cubes) maintained by THL. Most of the social welfare professionals' survey data are presented in the database report: Client data systems as tools for social care professionals (educated at university or university of applied sciences)

The analysis was carried out by comparing the social welfare professional's employment sectors (public sector and other= private and third sector). The five-point Likert scale assessments "Fully agree/very easy" and "Somewhat agree/fairly easy" were combined into "Agree/Easy" and the percentages of responses indicating agreement with the statements were used in comparing the sectors. The data were analyzed using descriptive statistics: frequency analysis and crosstabulations. Differences between the public and other sectors were analyzed with chi-square tests.

Usability of client information systems

Usability is a contextual property and refers to the extent to which users can achieve their goals by using interactive systems to complete their tasks (ISO 9241, 2018). The attributes of usability include effectiveness, efficiency, learnability, memorability and satisfaction (ISO 9241, 2018; Nielsen, 1994). Usability and user experience (UX) are considered closely related, overlapping concepts. Usability focuses on the interaction between the user and the interactive systems, whereas user experience (UX) refers to a person's perceptions and responses that result from the use or anticipated use of an information system (ISO 9241, 2019).

Regarding the overall satisfaction of professionals with information systems, social welfare professionals were asked to assess their principal CIS with a school grade on a scale from 4 to 10, where grades 8 to 10 corresponded to ratings from good to excellent. Figure 57 illustrates the summary of grades by presenting the proportion of grades 8 and higher (9 and 10) by employment sector: social welfare professionals working in the private or the third sector gave more positive assessments to their CISs than those working in the public sector ($p<0.001$).

School grade for the principal CIS 8-10
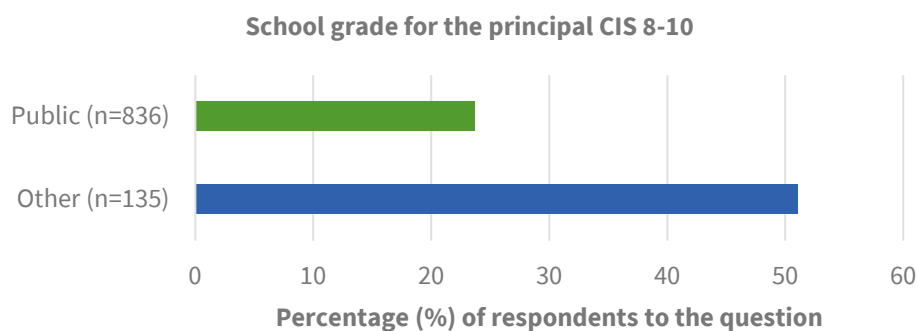
Figure 57. Overall satisfaction: School grades 8 and higher (good to excellent) given by social welfare professionals to their principally used CIS (n=971).

Several statements in the survey assessed the usability and technical quality of CISs. We report the results regarding the following statements: (1) routine tasks can be performed in a straightforward manner without the need for extra steps using the system; (2) a faulty or defective system function has caused or has nearly caused serious harm to the safety or well-being of the client; and (3) the system is stable in terms of technical functionality (does not crash, no downtime) (Figure 58). When compared with social welfare professionals working in the private and the third sector, their colleagues from the public sector were less satisfied with CIS support for routine tasks (p<0.001). The majority of the respondents gave relatively positive assessments of the technical qualities of their CISs, however, those working in the private and the third sector rated their CISs to be more stable than those working in the public sector (p≤0.001). About one in ten respondents considered faulty system functions having caused or nearly caused serious harm to the safety or well-being of the client.

Usability and technical quality
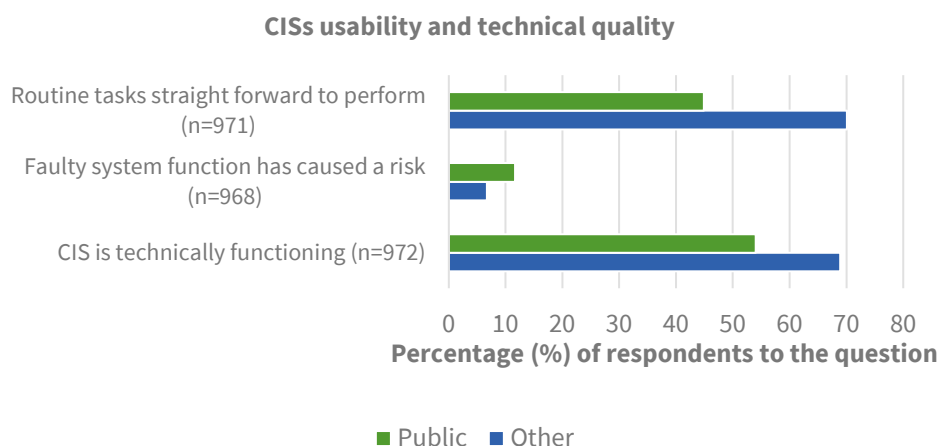
Figure 58. Proportion (%) of social welfare professionals agreeing with the client information system's usability and technical quality statements.

The results suggest that the technical functionality of the CISs used by social welfare professionals is at a relatively good level and that adverse events are rather rare. Moreover, the usability of systems seems to be satisfactory, especially in the private and third sectors, while there is room for improvement in the public sector, in particular to strengthen support for the performance of routine tasks.

Information systems support for case-based work

In Finland, CISs are the main sources of client information in the social welfare field and their importance is especially emphasized in 24-hour social and crisis services (Räsänen 2015; Salovaara et al., 2022). In addition to the functionality of information systems, it is essential that they provide tools for a holistic understanding of the client's situation. In social services, an understanding of the client's situation is formed in collaboration with the client and their network, so the understanding of the client's networks is pivotal (Salovaara & Ylönen, 2021). Previous research has raised concerns about the ability of CISs to support gaining a comprehensive understanding of the client's situation and it has been reported that client information has been lost in long case reports or fragmented in different parts of the CIS, and professionals have found it cumbersome to retrieve the information they need to complete their tasks (e.g. Huuskonen & Vakkari, 2013; Salovaara & Ylönen, 2021).

In the survey, the respondents were asked to assess how well their current CIS supported forming an overall understanding of a client's situation. Respondents were presented with four different aspects of case-based information: the client plan, the client´s services (previous, current and future services), the client´s multiprofessional network, and the client´s kinship network (Figure 59). Of all respondents 53–58% considered it easy to comprehend client plans with the support of the CIS, whereas one in four (24–28%) found it easy to understand the client's services. There were no significant differences between public or other sectors regarding understanding this client information. Regarding client networks, half (46%) of those working in the private and the third sector reported that comprehending clients' kinship network was easy, whereas the corresponding proportion in the public sector was 24%. Respectively, half (49%) of respondents working in the private or third sector assessed that comprehending clients´ multiprofessional networks was easy, while 27% of public sector professionals assessed the same. In responses regarding comprehending clients´ networks, the difference between sectors was statistically significant ($p<0.001$).

Understanding client´s overall situation
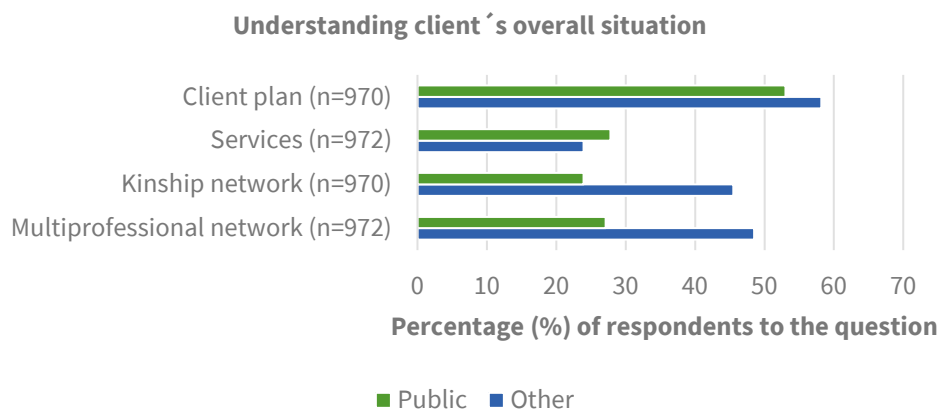
Figure 59. Proportion (%) of social welfare professionals who agreed with the statements concerning information systems' support for understanding clients overall situation.

The findings are consistent with previous studies concerning the insufficient support of CISs in forming an understanding of the overall situation of clients, especially concerning multiprofessional or kinship networks and social services, particularly in the public sector (e.g. Huuskonen and Vakkari 2013, Salovaara & Ylönen, 2021; Ylönen et al., 2020). Comprehending the client's overall situation is central to relationship-based work in social services. Deficiencies in CISs in presenting information related to clients prevent social welfare professionals from gaining access to the information they need, severely undermining case-based knowledge formation (Salovaara & Ylönen 2021).

However, half of those working in non-public sector perceive CIS support as adequate in comprehending client networks and plans. The differences between the sectors could probably be explained, at least in part, by the fact that the public sector, as the coordinator of the services, deals with much larger entities and client volumes compared to the actors in other sectors. Thus, in other sectors employees may not need to rely so heavily on CISs to form an understanding of the client's situation. This poses a challenge for the public sector to provide CISs that support professionals in comprehending such as complex and diverse number of client cases.

Having an overall picture of the client's current and planned services is particularly important in the public sector, which is responsible for coordinating the social services. Against this background, the result, that only a quarter of social welfare professionals consider that the CIS provides adequate support in gaining an understanding of client´s services, is concerning, especially for the public sector. It is clear that to

enable smooth service paths, the CIS should render it possible for professionals to perceive the client´s services effortlessly.

CISs have been identified as key sources of information for social welfare professionals in modern social services (Salovaara et al., 2022). At its best, a CIS supports professionals in knowledge formation and timely decision-making, and facilitates the storage, transfer, retrieval and use of information needed at work (Fitch 2019; Räsänen 2015). In the future, it will be important to examine in more detail the factors behind the positive assessments to identify the well-functioning features and technical solutions of CISs and to apply them more widely in the development of social service information systems (Salovaara & Ylönen 2021). There is also a need to support the involvement of professionals in the design and development work to make use of the experience gained from practice (Ministry of Social Affairs and Health 2015; Barfoed, 2019; Martikainen et al., 2021; Nadav et al. 2021). This approach is a good reflection of practice-led development of CISs (Baker et al., 2014).

Utilization of information systems for information exchange and collaboration

In this chapter, we examine the ways in which professionals exchange information and utilize CISs for information retrieval. Digitalization has had a significant impact on the ways information is managed and processed in the social services creating a shift from paper documentation to electronic data processing. This development has been supported by legislation, as well as national strategies and projects (Ministry of Social Affairs and Health, 2015; Rötsä, 2016; Act on the Electronic Processing of Client Data in Healthcare and Social Welfare 784/2021). Information in electronic form expands the possibilities for information exchange and utilization, but also requires attention to data security and transparency concerning the secondary use of client data. In social services, the abandonment of paper-based documentation has been decelerated by CIS-related problems, which have undermined professionals' confidence in them (Seniutis et al., 2021). Professionals in many places still rely on alternative solutions to support documentation and data processing (Huuskonen & Vakkari, 2013; Kyytsönen et al., 2020; Salovaara & Ylönen, 2021).

The ongoing implementation of the Kanta Services' National Client Data Archive for social welfare services is expected to bring solutions to the challenges related to data transfer especially as the collaboration between social welfare and healthcare intensifies with health and social services reform on the way (Rötsä, 2016; Tammelin & Mänttäri-van der Kuip, 2022). However, as sharing data requires consent, and there are no plans for legislation that would allow common client data registries between social welfare and healthcare, in the everyday work of social welfare personnel the benefits of the Kanta archive might remain limited. The strengthening of interprofessional cooperation and the use of CISs emphasizes the importance of data collection

from different registers on a client's situation. Case-based knowledge formation in the social services can be described as a creative and collaborative process that utilizes a variety of sources of information, including CIS (Räsänen, 2014; Salovaara & Ylönen, 2021).
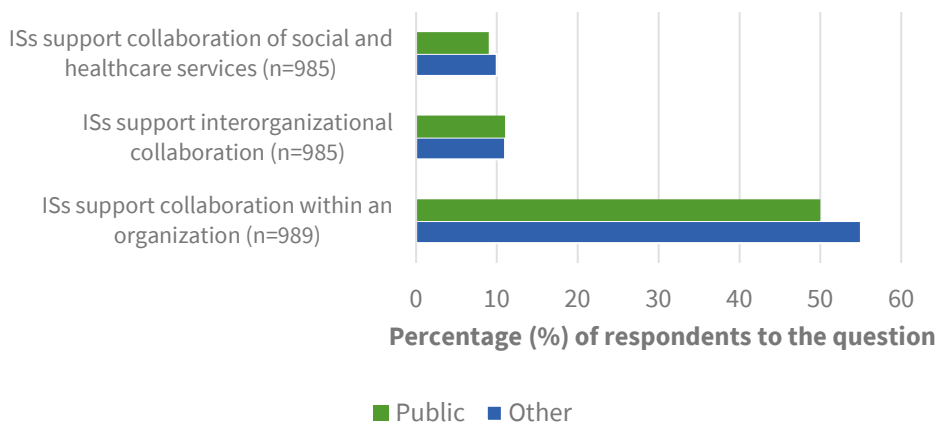
We asked social welfare professionals to what extent they use the different ways of obtaining client data. The response options included: daily, weekly, less frequently, and not at all. In the analysis the 'daily' and 'weekly' responses were combined to indicate: at least weekly. Nearly half (44%) of respondents in the public sector and 38% in other sectors used paper or fax at least weekly to exchange information (Figure 60). The National Client Data Archive (Kanta Services) was utilized at least weekly by 9% of respondents in the public sector and by 4% of those working in other sectors. There were no statistically significant differences between sectors, although the difference regarding utilization of Kanta Services was marginally significant ($p<0.05$).

Different modes of information exchange
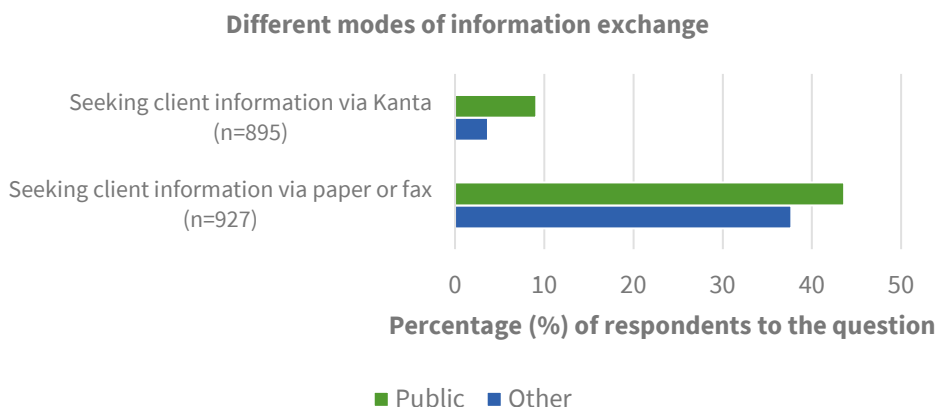
Figure 60. Proportion (%) of social welfare professionals using different modes of information exchange at least weekly in 2020.

We also asked professionals how well they considered ISs to support collaboration and information exchange between various parties (Figure 61). Half of the respondents (50–55%) assessed that information systems supported collaboration and information exchange within the organization, whereas a tenth (8–11%) of respondents agreed that ISs supported interorganizational collaboration and collaboration between social and healthcare services.

ISs support for collaboration and information exchange

Figure 61. Proportion (%) of social welfare professionals agreeing on ISs supporting collaboration and information exchange between various parties.

It is apparent that paper-based methods of information retrieval are still often used in social services. The results are partly explained by the limited transfer of data between the information systems of different organizations (Salovaara et al., 2021b). It is also possible that some professionals still rely on paper due to lack of trust in CISs (also Huuskonen & Vakkari, 2013; Seniutis et al., 2021). The results stress the importance of addressing previously identified barriers to the utilization of CISs, since dissatisfaction with CISs leads to reluctance to use them (Lavié & Fernandez, 2018), whereas a positive attitude towards a digital service increases the chances of successful implementation (Navad et al., 2021). The dissatisfaction in digital support for collaboration and information exchange is also partly explained by the strict and complex national legislation that creates challenges for organizations to enable digital information exchange between different parties (Salovaara et al., 2021b).

The National Client Data Archive (Kanta Services) is not yet widely utilized in the social welfare sector for information retrieval. The results reflect the fact that the transition to Kanta Services in social welfare is still in progress and the implementations will continue gradually. Public social welfare service providers have been given a transition period to join the archive and this period ends in September 2024. Private service providers have been given a transition period that ends in January 2026 (Act 784/2021). The development of the Kanta Services in general has been a long process and has required learning through experience. However, it seems that information security has improved in healthcare with the help of Kanta Services (Jormanainen & Reponen, 2020). To support the implementation of CISs and the Kanta Services, it would be worthwhile to utilize the recommendations and good practices developed

for the digital implementations (Kujala et al., 2018). There were no significant differences between the assessments of social welfare professionals working in the public or other sectors regarding the support provided by CISs for information exchange and collaboration.

Social welfare professionals' participation in information system development

The respondents were asked about their experiences in providing feedback about their CISs and participating in the development of CISs. The question put to the respondents was: what kind of experiences have you had of feedback on the CISs you use and of CIS development? The respondents were asked to respond to two statements with five-point Likert scale. They were asked to assess the following statements based on their experiences. These were: (1) I know how to and to whom I can send feedback about the system if I wish to do so; (2) the system vendor is interested in feedback about the system provided by the end users. The Likert scale options included: fully agree, somewhat agree, neither agree nor disagree, somewhat disagree and fully disagree. In Figure 62, the somewhat agree and fully agree items were combined and simplified into one item: agree.

More than half (56–59%) of the social welfare professionals knew how to and to whom they could send feedback about the information system they used (Figure 62). One in four (25%) of the respondents working in the public sector and one third (34,3%) of private sector social welfare professionals agreed that system vendors were interested in user feedback.
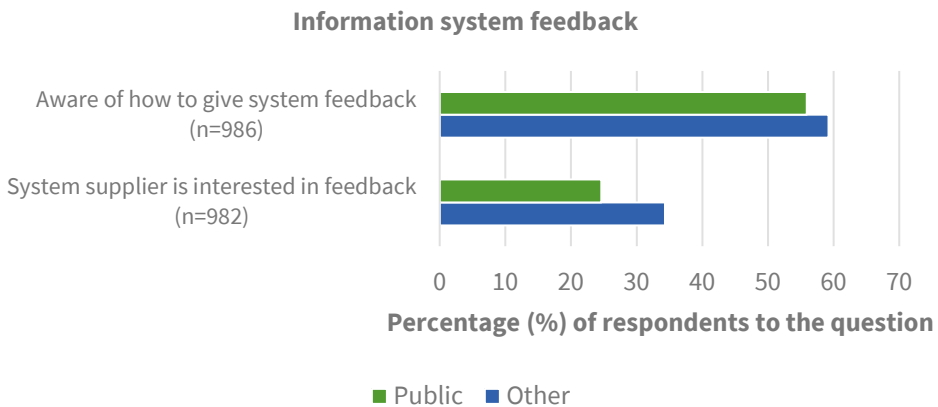
Figure 62. Proportion (%) of social welfare professionals agreeing with the information system feedback statements.

An earlier survey provided very similar results: data collected in April–May 2019 in a pilot survey of social welfare professionals showed that approximately half (56%) knew how to provide feedback to vendors and developers and 22% agreed that the vendor was interested in end-user feedback (Martikainen et al., 2021). Given that social welfare professionals themselves are willing to participate in the development of CISs, there is still much room for improvement from the system vendors' side to make better use of professional feedback in development work (Martikainen et al., 2021). On the other hand, some issues recognized by professionals might be resolved by adjusting the established procedures within organizations.
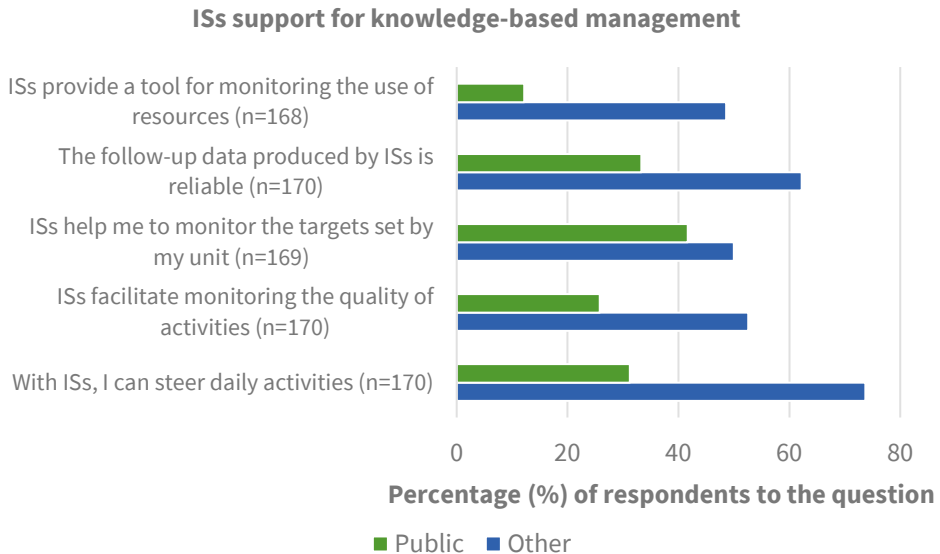
Client information systems support for management

The digital transformation emphasizes the importance of information systems designed to store and make available the information needed for decision-making at all organizational levels, including management (Fitch, 2019; Steiner, 2021). This chapter examines the support provided by CISs for knowledge-based management in social services. Information management is defined as actions where management decisions are based on knowledge formed based on information gathered about the organization's operations and its operating environment (Helander et al., 2020). The role of CISs is central in data collection, analysis, and utilization for knowledge-based management. However, in Finnish social welfare organizations, knowledge-based management is challenged by shortcomings related to competence, resources and information systems (Salovaara et al., 2021a).

In the usability survey of 2020 for social welfare professionals, there was a separate section concerning IS support for knowledge-based management. The respondents were directed to this section if they had indicated they held a leading/managerial position. We report the results of the following five statements: (1) I can use ISs to steer daily activity; (2) ISs facilitate measurement and monitoring of quality; (3) ISs help me to monitor achieving the targets set by my unit (e.g. client plans and volumes, time limits); (4) follow-up data provided by the ISs is reliable; and (5) I can use ISs to follow the use of personnel, equipment and room resources.

The results below are reported by the working sector i.e. public and other (private/third sector) (Figure 63). A total of 172 social welfare professionals indicated they had a managerial position, and 171 of them responded to at least one of the statements. In general, those working in the public sector were more critical than the others. Less than a third (31%) of the public sector managers but almost three quarters (74%) of the others indicated that they could use ISs for steering daily activity. Moreover, one third (33%) of the public sector managers, but more than half (62%) of the others considered data derived from Iss to be reliable and error-free. Only a few (12%) of those working in the public sector indicated that ISs allowed monitoring of resources; half (49%) of the others held this viewpoint. Only one quarter (26%) of the

public sector managers considered that ISs assisted in monitoring quality; in the other working sectors the respective proportion was more than half (53%). The views on monitoring the achievement of the targets set by the unit were similar between the groups (42% vs. 50%).

ISs support for knowledge-based management

Figure 63. Proportion (%) of social welfare professionals working in a managerial position agreeing with the statements concerning information systems' support for management.

Private and third sector organizations often provide services for the public sector, and they usually specialize in one service or target group, while the public sector as the financier of the services is obligated to offer all social services required by law. In small organizations, the volumes of activity are more moderate, and this is also reflected in the amount of data collected. Thus, it is understandable that public sector information management is a much broader, more diverse, and a more difficult entity to manage, which also poses challenges to information management (Salovaara et al., 2021a; Leinonen et al., 2021). On the other hand, to our knowledge, the majority of the CISs in social services only enable a limited amount of structural documentation, which is a requirement for high-quality reporting (see Hujanen et al., 2021).

This study did not map the knowledge-based management skills of managers, but in the light of previous research, there are gaps in competence (e.g. Salovaara, 2021a; Laihonen & Ahlgrén-Holappa, 2020). Competence gaps may partly explain the poor usability of CISs in support of knowledge-based management. The reliability of CIS data was better trusted in the non-public sector. Risks related to the reliability of CIS data have also been identified in the past (Huuskonen & Vakkari, 2013; De Witte et

al., 2016), which raises concerns, as the data collected via CISs will be used more widely in the future, for example to support research, development, and management work (Act on the Secondary Use of Health and Social Data 552/2019).

The results highlight the need to develop public sector CISs to better support knowledge-based management. This is important if the conditions for knowledge management are to be improved to support the achievement of the sector's growth and productivity goals (Laihonen & Ahlgrén-Holappa, 2020) as well as knowledge-based decision-making in client work.

References

Act on the Secondary Use of Health and Social Data 552/2019. https://www.finlex.fi/fi/laki/alkup/2019/20190552

Act on the Electronic Processing of Client Data in Healthcare and Social Welfare 784/2021. https://www.finlex.fi/fi/laki/alkup/2021/20210784

Baker, S, Warburton, J, Hodgkin, S, Pascal, J. (2014). Reimagining the Relationship between Social Work and Information Communication Technology in the Network Society. Australian social work, 67(4), 467-478. https://doi.org/10.1080/0312407X.2014.928336

Barfoed, E. M. (2019). Digital Clients: An Example of People Production in Social Work. Social inclusion, 7(1), 196-206. https://doi.org/10.17645/si.v7i1.1814

Barrera-Algarín, E, Sarasola-Sánchez-Serrano, J. L, Sarasola-Fernández, A. (2021). Social work in the face of emerging technologies: A technological acceptance study in 13 countries. International social work, 2087282110416. https://doi.org/10.1177/00208728211041672

Breit, E, Egeland, C, Løberg, I. B. & Røhnebæk, M. T. (2021). Digital coping: How frontline workers cope with digital service encounters. Social policy & administration, 55(5), 833-847. https://doi.org/10.1111/spol.12664

De Witte, J, Declercq, A, & Hermans, K. (2016). Street-level strategies of child welfare social workers in Flanders: The use of electronic client records in practice. British Journal of Social Work, 46(5), 1249–1265. https://doi.org/10.1093/bjsw/bcv076

Fitch, D. (2018). Using data to improve client services. In Goldkind, L, Wolf, L, Freddolino, P. P. Digital Social Work: Tools for Practice with Individuals, Organizations, and Communities, 109-125.

Gillingham, P. (2013). The development of electronic information systems for the future: Practitioners, 'embodied structures' and 'technologies-in-practice'. British Journal of Social Work, 43(3), 430–445.

Helander, N, Ahonen, O, Houhala, K, Jääskeläinen, A. (2020). Tiedolla johtaminen julkisella sektorilla: Käytännön tapauksia eri hallinnon aloilta. Focus localis, 48(3), 22-42.

Heponiemi, T, Gluschkoff, K, Vehko, T, Kaihlanen, A, Saranto, K, Nissinen, S, Nadav, J, Kujala, S. (2021) Electronic Health Record Implementations and Insufficient Training Endanger Nurses' Well-being: Cross-sectional Survey Study. J Med Internet Res 2021;23(12):e27096. doi: 10.2196/27096

Hujanen, K, Kinnunen, U.-M, Ailio, E, Koivumäki, L. (2021). The high quality structural documentation of social work described by social workers. Finnish Journal of EHealth and EWelfare, 13(4), 360–371. https://doi.org/10.23996/fjhw.109933

Huuskonen, S. & Vakkari, P. (2013). "I Did It My Way": Social workers as secondary designers of a client information system. Information processing & management, 49(1), 380–391. https://doi.org/10.1016/j.ipm.2012.05.003

Hyppönen, H, Kaipio, J, Heponiemi, T, Lääveri, T, Aalto, A, Vänskä, J, Elovainio, M. (2019). Developing the National Usability-Focused Health Information System Scale for Physicians: Validation Study. Journal of medical Internet research, 21(5), e12875. https://doi.org/10.2196/12875

Jormanainen, V, & Reponen, J. (2020). CAF and CAMM analyses on the first 10 years of national Kanta services in Finland. Finnish Journal of eHealth and eWelfare, 12(4), 302–315. https://doi.org/10.23996/fjhw.98548

Koskinen, R. (2014). One step further from detected contradictions in a child welfare unit-a constructive approach to communicate the needs of social work when implementing ICT in social services. European journal of social work, 17(2), 266–280. https://doi.org/10.1080/13691457.2013.802663

Kujala, S, Hörhammer, I, Ervast, M, Kolanen, H, Rauhala, M. (2018). Johtamisen hyvät käytännöt sähköisten omahoitopalveluiden käyttöönotossa. FinJeHeW, 10 (2-3, 221-235). https://doi.org/10.23996/fjhw.69140

Kyytsönen, M, Hyppönen, H, Koponen, S, Kinnunen, U.-M, Saranto, K, Kivekäs, E, Kaipio, J, Lääveri, T, Heponiemi, T, & Vehko, T. (2020). Information systems as supporters of nurses' work: experiences by system brand [Finnish, contains an English abstract]. FinJeHeW 12(3), 250–269. https://doi.org/10.23996/fjhw.95704

Laihonen, H, Ahlgren-Holappa, J. (2020). Tieto päätöksenteossa: 10 vuotta tietojohtamista julkisella sektorilla. Focus localis, 48(3), 43-62.

Lavié, A. H, Fernandez, A. I. L. (2018). New social intervention technologies as a challenge in social work: IFSW Europe perspective. European journal of social work, 21(6), 824-835. https://doi.org/10.1080/13691457.2018.1423553

Leinonen, J, Suhonen, M, Syväjärvi, A. (2021). Tieto haastaa toimijat ja käytännöt: Hyvinvointitiedon hyödyntäminen osana kuntien hyvinvointijohtamisen strategiatyötä. Focus localis, 49(3), 22-40.

Martikainen, S, Salovaara, S, Ylönen, K, Tynkkynen, E, Viitanen, J, Tyllinen, M. & Lääveri, T. (2021). Social welfare professionals willing to participate in client information system development - Results from a large cross-sectional survey. Informatics for health & social care, (ahead-of-print), 1–14. https://doi.org/10.1080/17538157.2021.2010736

McInroy, L. B. (2021). Teaching Technology Competencies: A Social Work Practice With Technology Course. Journal of social work education, 57(3), 545-556. https://doi.org/10.1080/10437797.2019.1671272

Ministry of Social Affairs and Health. (2015). Information to support well-being and service renewal. eHealth and eSocial Strategy 2020. Edita Prima, Helsinki. http://urn.fi/URN:ISBN:978-952-00-3575-4

Nadav, J, Kaihlanen, A, Kujala, S, Laukka, E, Hilama, P, Koivisto, J, Keskimäki, I, Heponiemi, T. (2021) How to Implement Digital Services in a Way That They Integrate Into Routine Work: Qualitative Interview Study Among Health and Social Care Professionals. J Med Internet Res 2021;23(12):e31668. doi: 10.2196/31668

Räsänen, J. (2015). Emergency Social Workers Navigating between Computer and Client. The British Journal of Social Work, 45(7), 2106–2123. https://doi.org/10.1093/bjsw/bcu031

Rötsä, M. (2016). Sosiaalihuollon tiedonhallinnan valtakunnallisen kehittämisen tila 2016 ja näkymiä vuoteen 2020. Finnish Journal of eHealth and eWelfare, 8(1), 41–44. https://journal.fi/finjehew/article/view/55989

Salovaara, S. (2021). Sosiaalityön tiedollisten tarpeiden huomioiminen tietojärjestelmä Apotissa. Finnish Journal of eHealth and eWelfare, 13(2), 133–146. https://doi.org/10.23996/fjhw.100692.

Salovaara, S, Hautala, S, Silén, M. (2022). Sosiaalialan ammattilaisten kyvykkyys tietojärjestelmien käyttäjinä ja kokemukset tietojärjestelmien tuesta työlle. [In Finnish with abstract in English: Ability of social welfare professionals as users of information systems (IS) and their experiences of IS support for work.] Finnish Journal of eHealth and eWelfare, 14(2), 208–225. https://doi.org/10.23996/fjhw.110119

Salovaara, S, Leinonen, J, Silén, M. (2021a). Tietojärjestelmien avulla kerätyn tiedon hyödyntämisen esteet sosiaalialan organisaatioiden tiedolla johtamisessa. Finnish Journal of eHealth and eWelfare, 13(4), 372–387. https://doi.org/10.23996/fjhw.109930

Salovaara, S, Silén, M, Vehko, T, Kyytsönen, M, Hautala, S. (2021b). Tieto- ja viestintäteknologian käyttö sosiaalihuollossa vuonna 2020. Raportti 10/2021. Terveyden ja hyvinvoinnin laitos (THL). https://urn.fi/URN:ISBN:978-952-343-772-2

Salovaara, S, Ylönen, K. (2021). Client information systems' support for case-based social work: Experiences of Finnish social workers. Nordic social work research, ahead-of-print(ahead-of-print), 1-15. https://doi.org/10.1080/2156857X.2021.1999847

Seniutis, M, Petružytė, D, Baltrūnaitė, M, Vainauskaitė, S, Petkevičius, L. (2021). The Impact of Information System on Interactions of Child Welfare Professionals with Managers and Clients. Sustainability (Basel, Switzerland), 13(12), 6765. https://doi.org/10.3390/su13126765

Shaw, I, Bell, M, Sinclair, I. (2009). An exemplary scheme?: An evaluation of the integrated children's system. The British journal of social work, 39(4), 613-626. https://doi.org/10.1093/bjsw/bcp040

Steiner, O. (2021). Social Work in the Digital Era: Theoretical, Ethical and Practical Considerations. The British journal of social work, 51(8), 3358-3374. https://doi.org/10.1093/bjsw/bcaa160

Tammelin, M, Mänttäri-van der Kuip, M. (2022). Policy Alienation in Frontline Social Work - A Study of Social Workers' Responses to a Major Anticipated Social and Health Care Reform in Finland. Ethics and social welfare, 16(1), 19-35. https://doi.org/10.1080/17496535.2021.1977836

Vänskä, J, Viitanen, J, Hyppönen, H, Elovainio, M, Winblad, I, Reponen, J, Lääveri, T. (2010). Lääkärien arviot potilastietojärjestelmistä kriittisiä. Suomen Lääkärilehti 65, 4177-4183.

Ylönen, K, Salovaara, S, Kaipio, J, Tyllinen, M, Tynkkynen, E, Hautala, S, Lääveri, T. (2020). Sosiaalialan asiakastietojärjestelmissä paljon parannettavaa: käyttäjäkokemukset 2019. Finnish Journal of eHealth and eWelfare, 12(1), 30–43. https://doi.org/10.23996/fjhw.88583

Zhu H, Andersen ST. ICT-mediated social work practice and innovation: professionals' experiences in the Norwegian Labour and Welfare Administration. (2021). Nordic Social Work Research 11(4), 346-360. https://doi.org/10.1080/2156857X.2020.1740774

Zhu, H, Andersen, S. T. Digital competence in social work practice and education: Experiences from Norway. Nordic Social Work Research, ahead-of-print(ahead-of-print), 1-16. https://doi.org/10.1080/2156857X.2021.1899967

Citizens' experiences of social welfare and healthcare e-services

Maiju Kyytsönen & Tuulikki Vehko

There are different types of e-services available for citizens in Finland. Some services include a professional contact, some are designed to support self-care or information exchange. The most used electronic healthcare service is the national health data repository's client interface for citizens, My Kanta Pages, that offers for example information of the prescriptions and healthcare records of the user and the possibility to give or deny a consent to information exchange between different care providers. Other national e-services include a mobile application for emergency situations (112 Suomi), a symptom assessment service (Omaolo), a health information site (Terveyskirjasto), a social security service (OmaKela) and a special healthcare service offering care pathways that require a referral (Terveyskylä). Besides national services, cities, regions, and municipal consortiums offer their residents local e-services for taking care of both social welfare and healthcare issues (Kyytsönen et al. 2021).

The use of e-services in social welfare and healthcare sectors has increased in Finland since the outbreak of COVID-19 pandemic on 11th March 2020 (Kyytsönen et al., 2021a; Kyytsönen et al. 2021b; WHO). From the beginning of 2019 to the end of 2020, remote service contacts (including phone calls) in primary healthcare increased eight percentage points, while physical visits decreased six percentage points so that remote contacts constituted 30 per cent of all different contact types (Kyytsönen et al. 2021). The increase in e-service use was a result of many factors, for example the recommendation to avoid social contacts, the development of new e-services, the resource increase in already existing e-services, and the modification of prevailing practices (Kestilä et al. 2020; Kestilä et al. 2021). The digitalisation of social welfare and healthcare sectors seem to have begun a new phase due to the pandemic and at this stage, it seems unlikely that the ratio of physical service use to electronic service use would return to the same level they were before the pandemic (Jormanainen et al. 2021; Kyytsönen et al. 2021). In February 2022, The Ministry of Social Affairs nd Health (MSAH) made a strategic statement that clients should be offered the possibility of engaining in services using digital solutions (Vuokko, 2022).

Finland is a welfare state, where citizens' statutory core services are organized by local authorities, which are financed publicly by taxes currently mainly through three channels: the municipal system, the national health insurance system and occupational healthcare (Keskimäki et al. 2019). In 2023, the municipalities handed their organizing responsibility to 21 wellbeing service counties as part of the health and social services reform in Finland. As an expection, the capital Helsinki continues to answer for the service production of its' citizens. This structure will have a profound effect on the digitalisation of social welfare and healthcare sectors in Finland from the

citizens' point of view. Firstly, since the core services are to a large extent publicly founded, it is possible to use national strategic steering to guide the development priorities (check, e.g.: MSAH & Association of Finnish Local and Regional Authorities, 2015). Secondly, since most services are still organized by municipalities and other local authorities, there are considerate differences in the range of services available for residents depending on where they live. The regional differences can act both as an opportunity to consider the unique needs of the local population and as a barrier to regional equality. After the introduction of the new wellbeing service counties, the servicescape can be expected to conform at least in the longer term. MSAH has also stated that regional development should be carried out in collaboration and dublicate solutions are to be avoided (Vuokko, 2022).

The results of the study that are next presented depict the social welfare and healthcare e-service use of the population of Finland in the end of 2020, before the health and social services reform and after the outbreak of the COVID-19-pandemic. A population survey was sent to respondents in September 2020. A smaller proportion of the respondents received an additional digi-module containing more detailed questions of social welfare and healthcare digitalisation. The respondents were picked from a national register based on a stratified random sampling design containing 22 strata (the 21 wellbeing service counties and Helsinki). 2,000 persons in age group 20–74-year-olds (400 for digi-module) and 800 in age group over 75-year-olds (200 for digi-module) from every region were included. It was possible to answer the survey in Finnish, Swedish, English, or Russian until the end of February in 2022. During this time, the respondents were contacted one to fours times to raise the response rate of the survey. After the data collection, the cross-sectional data set was weighted (Inverse Probability Weighting) so that the respondents represented the population in terms of age, sex, region, language, education, and marital status. The response rate of the main survey was 46.4 (n=28,199) and the digi-module 46.5 (n=6,034). (Kyytsönen et al., 2021a.) Some of the results are presented alongside the results of an equivalent survey study from 2017 (n=4,495) (Hyppönen et al. 2018, Hyppönen & Aalto, 2018).

Service use

The eHealth and eSocial Strategy 2020 states that citizens should use e-services and produce data for their own and for professionals' use and that reliable information on wellbeing and services should be available (MSAH & Association of Finnish Local and Regional Authorities, 2015). In 2020, e-services were used extensively by the population. As much as 83 per cent used general e-services independently, for example My Kanta Pages or MyTax. However, 11 per cent did not use e-services altogether and six per cent needed help in e-service use or their issues were delt by a

representative in the e-service. Almost half (48%) of over 74-year-olds did not use e-services altogether.

The use of social welfare or healthcare e-services was common: more than a fifth (22%) had visited a physician, a nurse, a social worker, a social instructor or some other social welfare or healthcare professional online during the last 12 months (Figure 64). The prevalence of use varied between wellbeing service counties from 12 to 35 per cent. A physician had been visited online by 17 per cent (Figure 65) and a nurse by 12 per cent (Figure 66). It seems that 20 to 54-year-olds visit physicians seven percentage points more often than nurses, whereas over 74-year-olds vitis the two professional groups equally. The difference might be due to older adults' more demanding health problems, which require a preliminary assessment by a nurse before consulting a physician. In the age group of 55 to 74-year-olds, the difference is more moderate (three percentage points).
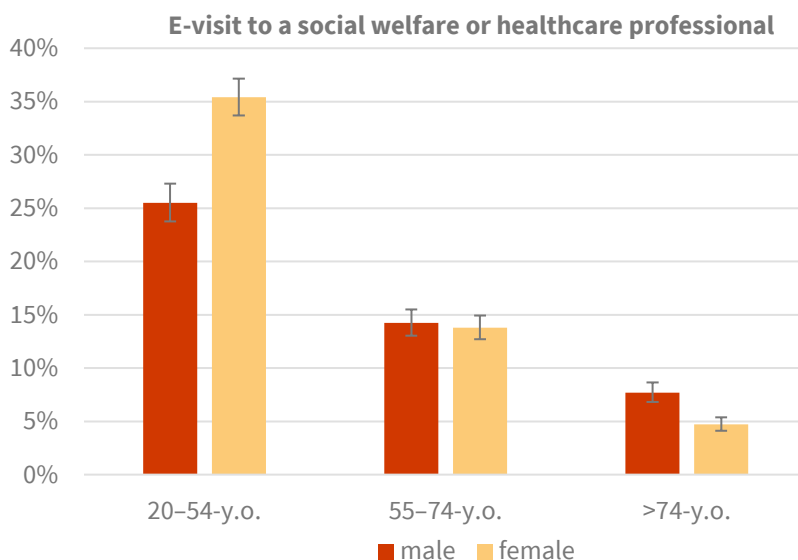
Figure 64. Per centage of men and women by age group who have visited a social welfare or healthcare professional electronically at least once during the last 12 months in 2020 (n = 28 199)

E-visit to a physician
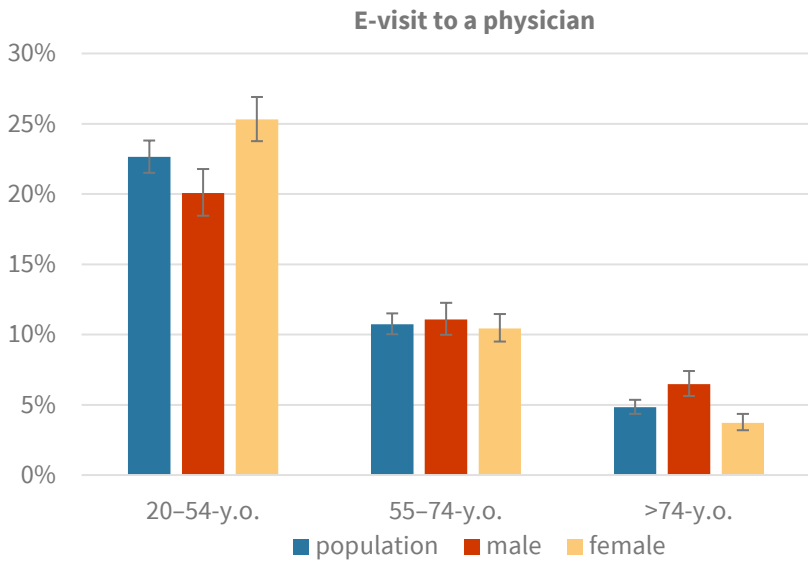

Figure 65. Per centage of men and women by age group who have visited a physician electronically at least once during the last 12 months in 2020 (n = 27 136)

E-visit to a nurse
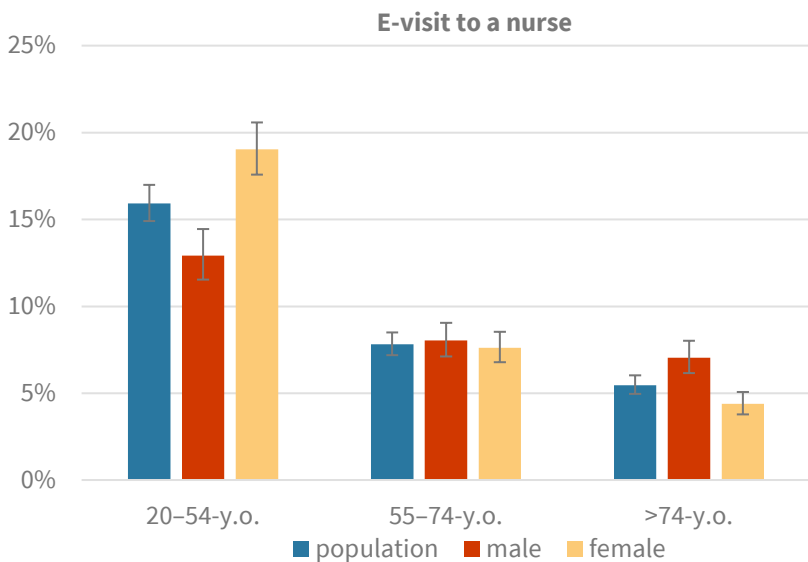
Figure 66. Per centage of men and women by age group who have visited a nurse electronically at least once during the last year in 2020 (n = 26 931)

In 2020, three out of five had searched for health or wellbeing related information and half had searched for information on the region's social welfare or healthcare services online (Figure 67). The activities increased 12 and 13 per cent respectively from 2017 to 2020. In 2020, it was also more common to take a risk test, assess symptoms or evaluate the state of health or functional capacity in an online service. As much as 27 per cent had done so, which is 17 per cent more than in 2017 (Figure 67). One reason for the substantial increase might be that the symptom assessment service Omaolo introduced a COVID-19 symptom assessment, which enabled booking a time for a COVID-19 test according to the local policy.
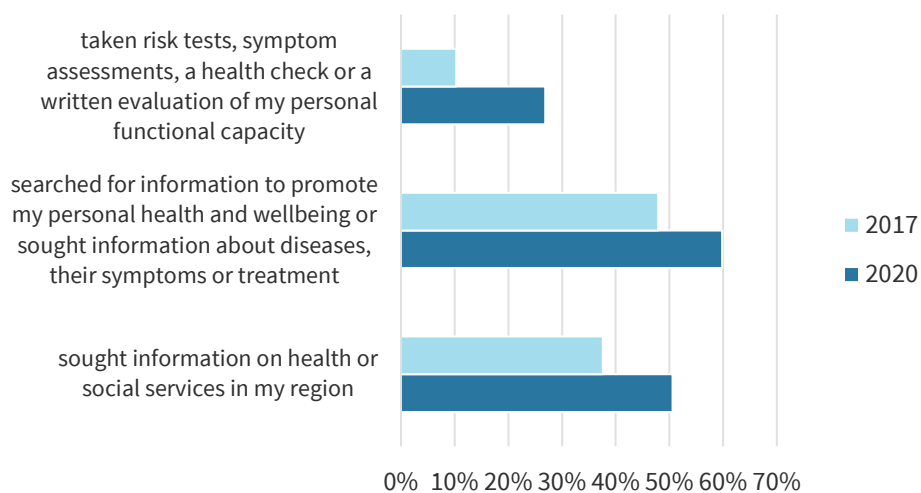
Figure 67. Per centage of people who had used the e-health and e-welfare functions in 2017 and 2020 (n= 6 034)

The national medical record service My Kanta Pages was used by 64 per cent and the symptom assessment service Omaolo by 21 per cent of the population. The special healthcare service Terveyskylä, that offers both reliable information to everyone and carepathways requiring a referral, was used by six per cent. A regional social welfare and/ or healthcare e-service was used by 12 per cent. Occupational healthcare e-services were used by a third of 20–69-year-olds. (Figure 68) Since as much as 83 per cent of the population used general e-services (not social welfare or healthcare specific), there is still unfulfilled potential in the number of users in social welfare and healthcare e-services.
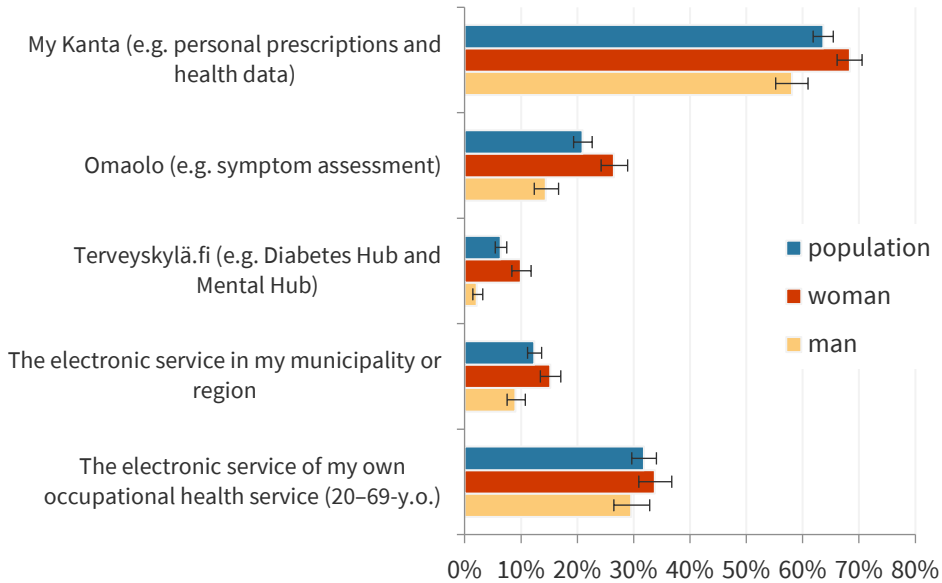
Figure 68. Per centage of people who had used the e-services during the last 12 months in 2020 (n = 6 034, occupational health service n = 4 675)

Seven per cent of the population had sent their personal information to a professional using a mobile device, the internet or smart technology, while 12 per cent had received guidance from a professional via these channels (Figure 69). Both activities were still relatively rare considering the strategic goal that citizens should produce information, that can be used by professionals when taking care of a patient or client.
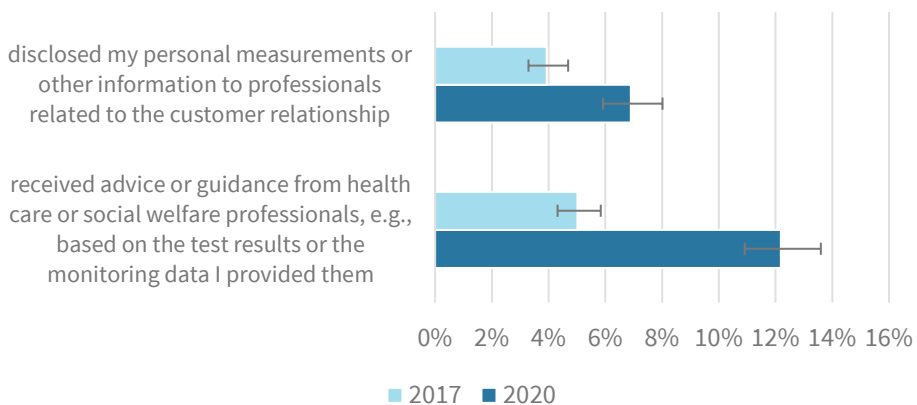
Figure 69. Per centage of people who had sent personal data and received guidance digitally in 2017 (n = 4 495) and 2020 (n = 6 034)

Benefits of electronic services

The benefits of electronic social welfare and healthcare services were asked with eight statements. Out of the statements, the respondents mostly agreed with that e-services make it easier to use services regardless of place and time (58%) (Figure 70). Many also appreciated their help in choosing and finding suitable services (53%). Other benefits were agreed with by less than half of the population, for example 39 per cent believed that social welfare and healthcare e-services help in taking an active role in looking after their own health or wellbeing. The result is promising and indicates that at least to some degree the available e-services have been able to support people in taking responsibility of their own health and wellbeing. In the future, it is important to secure the upward trend of this parameter.

Social welfare and healthcare e-services…

Statement	Percentage
make it easier for me to use services regardless of where I am and when	58%
supporting me in finding and choosing the most suitable services	53%
help me to assess the need for services	45%
make it easier for me to collaborate with professionals	45%
help me to take an active role in looking after my own health and welfare	39%
help tailor the service to my individual needs	34%
help me to take care of the health, welfare and functional capacity of family or friends	31%
help me to maintain a healthy lifestyle	23%

Percentage of respondents who agree

Figure 70. Per centage of people who agreed on the benefit statements of social welfare and healthcare e-services in 2020 (n = 28 199)

Non-use of electronic services

The use of e-services requires, for example a decent internet connection, a device, a means of e-identification, skills, and information. In Finland, 85 per cent of the population assessed their digital skills good. Older age groups assessed their skills systematically poorer than younger age groups (Figure 71). Internet access was available to 54 per cent of over 74-year-olds and to 90 per cent of 55 to 74-year-olds. The poor quality of the internet connection was experienced as a barrier to e-service use by every tenth, but the per centages differet from region to region. A means of e-identification was possessed by 57 per cent of over 74-year-olds and by 89 per cent of 55 to 74-year-olds. Acting on behalf of another person in social welfare or healthcare e-services increased from 2017 to 2020 by five percentage points (to 9%).
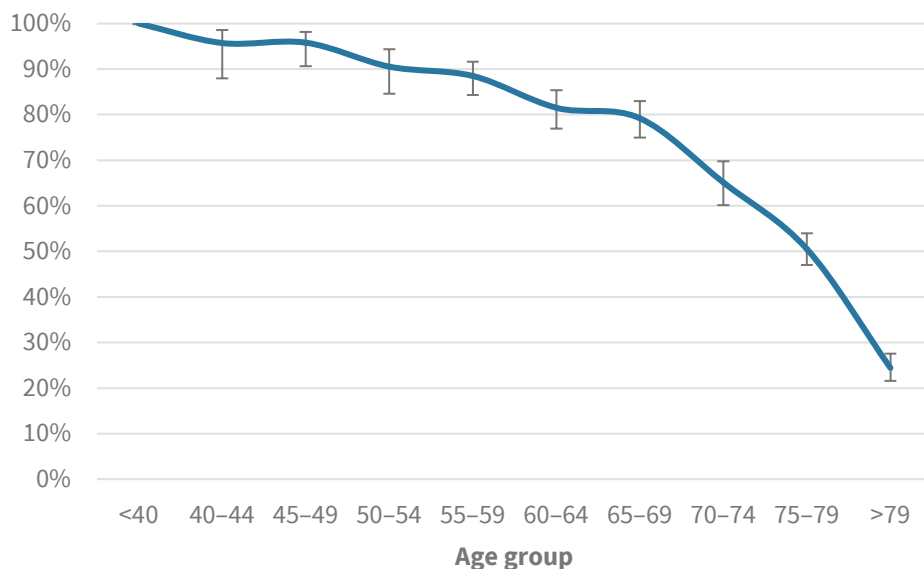
Figure 71. Per centage of people who assessed their digital skills good (a sum variable of six statements) grouped by age groups (n = 5 618)

Two out of three (66%) thought that face-to-face services cannot be replaced by an electronic contact in social welfare or healthcare services. Additionally, over a third (37%) were concerned over their personal information when using e-services. On the other hand, 17 per cent saw the lack of necessary social welfare and healthcare e-services as a barrier to their e-service use. The servicescape barrier was experienced especially by people over 74-years-old (29%). 15 per cent of the population also saw the accessibility of e-services as inadequate; accessibility problems were experienced

by every tenth of 20–54-year-olds and not only by the elderly. These findings high-light the need to channel efforts to enhance the accessibility and quality of the existing servises, increase clients' knowledge of the servicescape and to distribute information on the information security measures taken to ensure the services are safe to use. There is moreover reason to consider ecpesialy the older adults, who more often experience that the present services do not serve their needs: are there age-related gaps in the existing e-servicescapes?

Highlights of the progress of eHealth and eSocial Strategy 2020 goals from the citizens' point of view

The strategy aimed to steer the country to a situation, where the citizens use e-services to support their health and wellbeing (MSAH & Association of Finnish Local and Regional Authorities, 2015). The quantity and resource allocation of especially e-health services for citizens has increased. Towards the end of the year 2020 the use of My Kanta Pages was common (64%), while other social welfare and healthcare ser-vices were being used to a varying extend, for example a local e-service had been used by more than every tenth and occupational healthcare e-services by two thirds of the working aged. The e-service users were on average content with the quality of the available e-services (My Kanta Pages, Omaolo, Terveyskylä, local e-service and oc-cupational health care) (Kyytsönen et al 2020).

The strategy moreover visioned that people would produce information of their health and social situation, which could be used by the service providers (MSAH & Association of Finnish Local and Regional Authorities, 2015; Vuokko, 2022). The sending of such information and then receiving guidance based on the information concerned around every tenth, which is considerably more than in 2017. Additionally, the data of Omaolo symptom assessment service was found to be useful in predicting COVID-19 related admissions (Limingoja et al. 2022), which represents the possibil-ities of secondary use of healthcare data.

Even though most people in Finland use e-services, 11 per cent do not (Kyytsönen et al., 2021). The digitally excluded part of the population might for example lack an internet connection and the necessary skills in navigating digital environments. For example, the non-use of My Kanta Pages was associated with not being referred to e-services by a social welfare or healthcare professional and with needing guidance in e-service use (Kainiemi et al. 2022). Particularly during the COVID-19 pandemic, those who did not use e-services were in a vulnerable positiong because the pandemic weakened access to non-urgent physical treatment as reasouces were directed to COVID-19 testing, contact tracing, patient care and guidance (Kestilä et al. 2020). At the same time, 3.2 million individuals, which is approximately 58% of the population, downloaded the COVID passport (a proof of having been vaccinated against COVID-19) from My Kanta Pages by Christmas 2021 (Kanta Services, 2021; Official

Statistics of Finland, 2022). The digitally excluded had to find another way to obtain the passport, for example by calling the place of vaccination and waiting for the passport to be mailed home.

To conclude, the physical and phone call services need to be secured to ensure that everybody has equal access to social welfare and healthcare services, since there are still many people who cannot or choose not to use e-services. Secondly, the use of e-services is increasing. Thirdly, e-service users see benefits in social welfare and healthcare e-sercvice use, but also experience concerns and barriers to e-service use. This report contributes to the knowledge base and can be used to better understand e-service use from the citizens point of view and in detecting matters in the service system that need more attention.

References

Questionnaires. 2017, 2020. https://thl.fi/en/web/information-management-in-social-welfare-and-health-care/what-is-information-management-/follow-up-of-the-information-system-services-in-social-welfare-and-health-care/implementation-of-the-monitoring-of-information-system-services-in-social-welfare-and-healthcare

Hyppönen, H., Pentala-Nikulainen, O. & Aalto, A-M. 2018. Sosiaali- ja terveydenhuollon sähköinen asiointi 2017, Kansalaisten kokemukset ja tarpeet. Finnish Institute for Health and Welfare, report 3/2018. https://urn.fi/URN:ISBN:978-952-343-103-4

Hyppönen, H. & Aalto, A-M. 2019. Citizens experiences of e-health and e-welfare services. In Vehko, Tuulikki, Ruotsalainen, Salla & Hyppönen, H. (Eds.), E-health and e-welfare of Finland: Check point 2018. Finnish Institute for Health and Welfare, report 3/2018. http://urn.fi/URN:ISBN:978-952-343-326-7

Jormanainen, V., Mattila, H., Niemi, A., Berg, P., Horto, A., Hyrkäs, H., Iivonen-Lahti, M., Inkinen, H., Kärnä, E., Merivuori, T., Myllymäki, K., Mäki, S., Mäkinen, S., Rekiaro, M. & Seppinen, L. 2020. Etäasiointi tullut jäädäkseen myös perusterveydenhuoltoon. In Kestilä, Laura, Jokela, Merita, Härmä, Vuokko & Rissanen Pekka (Eds.), Covid19-epidemian vaikutukset hyvinvointiin, palvelujärjestelmään ja kansantalouteen: Asiantuntija-arvio, kevät 2021. Finnish Institute for Health and Welfare, report 3/2021. https://urn.fi/URN:ISBN:978-952-343-649-7

Kainiemi, E., Vehko, T., Kyytsönen, M., Hörhammer, I., Kujala, S., Jormanainen, V., Heponiemi, T. 2022. Factors Associated with Non-use of and Dissatisfaction with the National Patient Portal in Finland in the Era of COVID-19: A Population-based Cross-sectional Survey Study. JMIR Preprints. 24/02/2022:37500

Kanta Services. 2021. COVID-19 passport brought new users to My Kanta Pages – about 3.2 million people already have COVID-19 vaccination certificate. Notice, released 21st December 2021. https://www.kanta.fi/en/notice/-/asset_publisher/cf6QCnduV1x6/content/koronapassi-toi-omakannalle-uusia-kayttajia

Keskimäki, I., Tynkkynen, L-K., Reissell, E., Koivusalo, M., Syrjä, V., Vuorenkoski, L., Rechel, B., Karanikolos, M. 2019. Finland: Health system review. Health Systems in Transition, 21(2): 1 – 166. https://apps.who.int/iris/handle/10665/327538

Kestilä, L., Härmä, V. & Rissanen, P. (Eds.) 2021. Covid-19-epidemian vaikutukset hyvinvointiin, palvelujärjestelmään ja kansantalouteen: Asiantuntija-arvio, kevät 2021. Finnish Institute for Health and Welfare, report 14/2020. https://urn.fi/URN:ISBN:978-952-343-649-7

Kestilä, L., Jokela, M., Härmä, V. & Rissanen, P. (Eds.) 2020. Covid19-epidemian vaikutukset hyvinvointiin, palvelujärjestelmään ja kansantalouteen: Asiantuntija-arvio, syksy 2020. Finnish Institute for Health and Welfare, report 3/2021. http://urn.fi/URN:ISBN:978-952-343-578-0

Kyytsönen, M., Aalto, A-M. & Vehko, T. 2021a. Sosiaali- ja terveydenhuollon sähköinen asiointi 2020–2021: Väestön kokemukset [contains an English abstract]. Finnish Institute for Health and Welfare, report 7/2021. http://urn.fi/URN:ISBN:978-952-343-680-0

Kyytsönen, M., Vehko, T., Jormanainen, V., Aalto, A-M. & Mölläri, K. 2021b. Terveydenhuollon etäasioinnin trendit vuosien 2013–2020 Avohilmon aineistossa. Finnish Institute for Health and Welfare, short report 13/2021. http://urn.fi/URN:ISBN:978-952-343-639-8

Kyytsönen, M., Piirainen, M., Latvanen, M., Muuri, A. & Vehko, T. 2022. Sähköinen asiointi sosi-aali- ja terveydenhuollossa – ketkä tarvitsevat opastusta ja keille palvelut eivät ole esteettömiä? Finnish Institute for Health and Welfare, short report 5/2022. http://urn.fi/URN:ISBN:978-952-343-818-7

Limingoja, L., Antila, K., Jormanainen, V., Röntynen, J., Jägerroos, V., Soininen, L., Nordlund, H., Vepsäläinen, K., Kaikkonen, R. & Lallukka, T. 2022. Impact of a CE-Marked Medical Software Sensor on COVID-19 Pandemic Progression Prediction: a Register Study Using Machine Learning Methods. JMIR Formative Research. 04/02/2022:35181 (in press). PMID: 35179497

Ministry of Social Affairs and Health & Association of Finnish Local and Regional Authorities. 2014. Information to support wellbeing and service renewal. eHealth and eSocial Strategy 2020. Publications of Ministry of Social Affairs and Health, 2015. http://urn.fi/URN:ISBN:978-952-00-3575-4

Official Statistics of Finland. 2022. Preliminary population statistics [e-publication].
ISSN=2243-3627. January 2022. Helsinki: Statistics Finland. Referred 2.3.2022. http://www.stat.fi/til/vamuu/2022/01/vamuu_2022_01_2022-02-22_tie_001_en.html

Vuokko, R. (2022) Sosiaali- ja terveydenhuollon tiedonhallinnan linjaukset. Ministry of Social Affairs and Health. Referred 23.3.2022. https://yhteistyotilat.fi/wiki08/display/THLSKAU/Sote+KA+kansallinen+kokonaisarkkitehtuuri?preview=/57733325/84740069/Sote-tiedonhallinnan%20linjaukset%202021.pdf

WHO: Coronavirus disease (COVID-19) pandemic. Referred to on February 21st 2022. https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov#:~:text=On%2030%20January%202020%2C%20Dr,in%2018%20countries%20outside%20China

The open database reports can be used to view the survey results

Tuulikki Vehko & Maiju Kyytsönen

Part of the results of the surveys presented in this report can be viewed from the open database reports of Finnish Institute for Health and Welfare. The aim of the reports is to advocate open science and the use of the survey results. The results are presented as summaries and cubes. They enable users to make their own selections from the materials. The metadata for each question is also available in cubes. The following links lead to the web pages:

- [Availability and use of e-health in Finland](#)
- [Availability and use of e-welfare in Finland](#)
- [Physicians' experiences of electronic health records](#)
- [Nurses' experiences of electronic health records and client information systems](#)
- [Social welfare professionals' experiences of client information systems](#)

Key points and conclusion

The STePS 3.0 project, 'Monitoring and assessment of social welfare and health care information system services' explored the availability and use of information systems and digital services by organisations, as well as the experiences of professionals with information systems and processes. As regards citizens, experiences with digital services and service needs were studied. This chapter gives highlighted key points that the surveys conducted at 2020−2021 raised. The main results of these surveys can be read from the abstract. This capter starts with considerations relating to the context of the Finnish health and social services reform. Then we introduced chapter by chapter key points which would require different levels of action to fully benefit from digitalisation.

The Finnish healthcare and social care system and ICT-policies

- Finnish citizens are **covered by the universal social security, public health, healthcare and social welfare service system**. Until now, municipalities have been in charge of organizing healthcare and social welfare services. This is augmented by private sector which accounts roughly one quarter of the service provision.
- **The ongoing health and social services reform changes the financial and organizational basis** for public social welfare and healthcare services from 2023 onwards. This major reform consolidated the fragmented municipal organizations into 21 welfare counties, Åland, city of Helsinki and the Helsinki University hospital district are financed directly by the state. This major change opens new possibilities to share information and improve patient care policies.
- Finland has **systematically developed its national and local healthcare and social welfare ICT infrastructure** since the first healthcare and social welfare ICT strategy in 1995. The updated strategies have influenced both funding, investments and legislation, most notably after the legislation on national ICT services for healthcare and social welfare became effective in 2007.
- The national **Kanta Services are the backbone of the electronic social welfare and electronic health services** in Finland. Modularity of the Kanta Services enables service system necessary additions. Starting initially from electronic prescription services of the Prescription Centre, Patient Data Repository and citizen accessible national portal services (My Kanta), the combined Kanta Services provide today access to relevant health information to all important stakeholders and are increasing the coverage in social welfare services (Client Data Repository for social services), too. The important aspect of Kanta Services is the **national standardization** of data

formats and information exchange in order to maximise interoperability between data systems.

- Finland reached the decision to utilize its comprehensive registries, and implemented already in 2019 a **law on secondary use of social and health care data** in research, innovation and education. Since 2019, the Finnish Social and Health Data Permit Authority (Findata) has granted permits for secondary use of social and healthcare data and improved data protection for individuals. After granting the permit Findata compile, combine and pre-process data and offer tools for analysing.
- Because of the long-term development history, the **legislation related to digital services is partly fragmented and there is a constant need for updates and consolidation**. Most currently, the legislation related to client and patient information is under reform.

Availability and use of e-health in Finland

- Changes in the organizational structure related to health and social services reform, will have a significant impact on the construction of information systems. Before the reform the data shows that all key patient data is exclusively processed electronically in specialised medical care, primary health care and in the activities of private sector actors.
- The trend of eHealth services intended for citizens has steadily increased.

Availability and use of e-welfare in Finland

- In 2020, digital services were provided in slightly more social welfare organizations than before.
- Electronic CISs were in use in almost all public social welfare organizations, but about a quarter of non-public social welfare organizations still operated without one.
- A minority of social welfare organizations reported started using Kanta Services. The updated legislation clarifies the implementation of national data structures (Act 784/2021) and is likely to accelerate the wider deployment of harmonized data structures.
- Of particular concern is the lack of knowledge in some organizations on whether national information management solutions have been implemented.
- In conclusion, the objectives of the 'Information to support well-being and service renewal - eHealth and eSocial Strategy 2020' have not been met by 2020 in terms of social welfare, although progress has been made in some areas.

Summary regarding physicians' experiences

- In general, the usage of paper documents in health information exchange between various parties has decreased in Finland. Electronic solutions of health information exchange have been increased and the national Kanta Services play an important role.
- The Finnish 'Information to support well-being and service renewal - eHealth and eSocial Strategy 2020' objectives targeted to increase the benefits of health information systems such as avoid duplicate tests, however, the development seems to have stalled to a modest level (30%) in 2021.
- Physicians' assessment related to information systems support interorganizational collaboration remain low. Future research will reveal, how this challenge is targeted with the health and social services reform, which aims to integrate various actors in the patient care path within the same organization throughout the public sector.
- Physicians' views regarding whether IT supports physician – patient collaboration was still relatively negative (overall only 25% agreed) in 2021.

Summary regarding nurses' experiences

- The results in 2020 suggest that collaboration within the organization is at a good level, but support for patient information exchange in interorganizational collaboration is low. Further studies to follow up trends in the experienced benefits related to HIS are needed.
- Obtaining patient data via the Kanta Services is an important mode of HIE, but at the time of measurement, this did not appear to be a very common practice in the work of registered nurses. Further, it is obvious that patients need nurses' guidance to be able to use the services.
- The health information systems do not fully support registered nurses in terms of their daily patient care documentation and the availability of patient information. Quality of care and patient safety were seen to benefit from HIS usage but need continuous monitoring in the digital care environment.
- Even though HISs have been available, and nurses have used them for years, it seems that nurses need more timely education in practice. The education and training of registered nurses does not go hand in hand with the rapid development of digital social welfare and healthcare services.

Summary regarding social welfare professionals' experiences

- The objective of the 'Information to support well-being and service renewal - eHealth and eSocial Strategy 2020' for CISs that support the work of professionals is only partially realized in social welfare field.
- Assessments of CISs by social welfare professionals have indicated that the technical functionality of the CISs and the support for the performance of routine tasks are at a satisfactory level, while a number of aspects for improvement have been identified in several other areas, such as support for case-based knowledge formation, collaboration and information exchange.
- In the public sector, assessments of CISs perceived support for social welfare professionals while managers have been more critical.
- The results highlight the wider responsibility of the public sector in coordinating client services and arranging social services in general, while private and third sector actors tend to focus on a specific service or client group as they act as service providers often for a municipality or municipal consortium. This will understandably place more demands on public sector information systems, and special attention should be paid to this in the future development of CISs.

Citizens' experiences of social welfare and healthcare e-services

- The population of Finland has good prerequisites for e-service use. General e-services were used by 83 per cent of the population, while more than every fifth had visited a social welfare or healthcare professional online in 2020.
- Almost two out of tree had used the national health data repository's client interface for citizens: My Kanta Pages, which has received good evaluations from its' users (a grade of good plus).
- Still, many believe that e-services cannot replace traditional face-to-face service use. At the same time, 17 per cent of the population think that the present services do not provide sufficient possibilities for them to take care of their social welfare or healthcare needs online.

Conclusion

In Finland, there has been a long-term commitment in the development of information systems for health and social care services based on national strategies. This has included both centralized national services and guidance to regional and local service providers for their development. Finland has been obedient to international standards and built its national infrastructure step by step and in a continuous manner regardless of government programmes which last four years.

The health care actors have been involved both to the strategic planning and practical implementation and expert opinions have been guiding the development. A combination of legislation, financing policies and used co-creation model have been enablers for the roll-out of digital information systems.

Even though there is a good availability of health information systems and digital services both for professionals and citizens, there is still lack of their usage in various fields. Especially improvements are needed in communication with the patients at local level and with the access to patient provided data. In terms of professionals´user experience, both physicians and nurses request more fluent information exchange between organizations. In future health and social services reform with welfare counties with more uniform information systems is expected to facilitate better access to data in day-to-day care processes. A new act 'Act on the Electronic Processing of Client Data in Healthcare and Social Welfare' will open new possibilities to utilize patient generated data in decision-making, too.

Because of the magnitude of these changes, systematic follow-up monitoring is needed to reveal the outcomes, and give guidance to required changes, where appropriate. The electronic health record systems are a key tool for professionals both in the primary and secondary usage purposes. In social welfare the development is more transgressive, on the one hand electronic CISs were in use in almost all public social welfare organizations and there are interest in use of information on the secondary usage purposes. On the other hand, at the same time a quarter of non-public social welfare organizations still operated without CIS. According to user experiences, the inner logic and user interfaces of those systems require constant development that serves actions in daily work. The complexity of various stakeholders has increased, and it requires time and patience to fulfill the goals. Moreover, the end-users expectations related to information systems are increasing in the course of time.

All in all, the implementation needs time, several four-year Finnish government programmes.

Abbrevations

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
DVV	The Digital and Population Data Services Agency
ECG	electrocardiogram
ECTS	European Credit Transfer and Accumulation System
EDI	electronic data interchange
EFM	the European Federation for Medical Informatics
EPR	electronic patient record
EHR	electronic health record
EMR	electronic medical record
FinCC	Finnish Care Classification
FiCND	Finnish Classification of Nursing Diagnoses
FiCNI	Finnish Classification of Nursing Interventions
FiCNO	Finnish Classification of Nursing Outcomes
FinnSHIA	The Finnish Social and Healthcare Informatics Association
FNA	Finnish Nurses Association
FMA	Finnish Medical association
FIOH	the Finnish Institute of Occupational Health (TTL)
Fimea	Finnish Medicines Agency
FSTeH	The Finnish Society for Telemedicine and e-health
GP	general practitioner
GDP	gross domestic product
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

Kanta Services	The national archiving services for electronic processing of client data in healthcare and social welfare. Kanta Services produce digital services for citizens, pharmacies, healthcare services and social welfare services.
Kela	Social Insurance Institution of Finland
Kuntaliitto	Association of Finnish Municipalities
MSAH	Ministry of Social Affairs and Health in Finland
My Kanta Pages	My Kanta pages give Finnish citizens an access to their electronic prescriptions, medical records, COVID 19 certifications, consent management, living will, and organ donation testament.
LIS	laboratory information system
NeRN	Nordic eHealth Research Network
NGO	non-governmental organisation
NuHISS	the National Usability-Focused Health Information System Scale
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
RHI	regional information exchanges
RIS	radiological information system
SITRA	The Finnish Innovation Fund Sitra
SMS	short message service
SSL	secure socket layer
STePS	Monitoring and assessment of social welfare and health care information system services' -project
STM	Ministry of Social Affairs and Health in Finland
STUK	Radiation and Nuclear Safety Authority in Finland
TAJA	National Professional Association for the Interests of Experts and Managers in Healthcare
Tehy	Union of Health and Social Care Professionals in Finland
TEKES	Business Finland, earlier called National Technology Agency
THL	Finnish 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