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Finnish e-health services intended for citizens – national and regional development

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Abstract

Electronic health care (e-health) services intended for Finnish citizens have been recently developed nationally, regionally, and locally through several projects and programs. This study aimed to investigate 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. In addition, the differences between the availability of services in different sectors and regional differences between hospital districts were investigated.

Data were collected using web-based questionnaires in 2011, 2014, 2017, and 2020 from "Use of information and communication technology surveys in Finnish health care". This study covers all 21 hospital districts, nearly all primary health care centers, and a sample of private medical service providers. Quantitative data were analyzed using SPSS software (version 25). The availability of an e-health service was calculated as a percentage of all respondents in each sector.

The results of this study show that public and private health care organizations extensively offered health care services on their websites. Almost all organizations had information on well-being, provided services, contact methods, and locations, as well as options to send electronic feedback. Remote consultation, electronic appointment booking services, and telephone counseling were also extensively offered. This study revealed that the volume of e-health services increased from 2011 to 2020. For instance, remote consultation services and information exchange through encrypted email increased rapidly during follow-up periods in all service sectors. Comparing service sectors revealed that specialized health care covers e-health services more extensively than do primary health care and private service providers. According to this study, there are also clear differences in the availability of services be-

tween hospital districts and no hospital district offered all studied services. These results suggest the need to clarify national and regional development responsibilities and standardize the availability of e-health services within and between hospital districts.

Keywords: eHealth, health services, information technology, telemedicine

Introduction

Electronic health services (e-Health) refer to healthcare products, services, and processes that use information and communication technology [1,2]. They cover for example information exchange between patients and healthcare professionals, electronic patient records (EPR) and telemedicine services [2]. The aim of the e-health services is to improve the health of citizens, the efficient provision of health services, productivity, and the economic and social value of health [2]. In 2015, the Finnish Ministry of Social Affairs and Health (STM) published a national strategy, "Information to support well-being and service renewal, e-health and e-welfare strategy 2020" that has guided information management and the development of e-health services in health care [3,4]. This was followed by the STM 2030 strategy [5] that emphasizes, like the 2020 strategy [4], citizens being able to manage their health independently regardless of time and place, with the help of a professional if necessary. The purpose is to support citizens in actively maintaining their well-being by improving the quality and availability of e-health services [4,5].

E-health services have been developed nationally, regionally, and locally over the last ten years in several projects and programs. The e-Services and Democracy Acceleration Program (SADe) developed new policies and e-services for health care by emphasizing citizen involvement [6]. To develop national health information exchange (Kanta) services, the My Kanta Pages service was introduced so citizens can find their prescriptions, treatment-related records, and laboratory and x-ray examinations [7]. In the Own Digital Welfare Services (ODA) and Virtual Hospital 2.0 projects supported by STM, digital services were produced so citizens can use health services, regardless of time and place [8]. The ODA project developed the digital Omaolo service package, including smart symptom assessment and diagnosis [9,10]. The Virtual Hospital 2.0 project built several e-health services under the Health Village (Terveyskylä.fi) brand, including digital self-care paths and symptom navigators for patients [11,12]. Citizens' good digital skills and positive attitudes toward using e-services also provide good starting points for developing e-health services [13].

In 1999 and 2001, the first nationwide surveys to measure organizations' use of social and health care information technology solutions included several questions about services provided to citizens [14,15]. Then, FinnTelemedicum and THL systematically arranged ICT surveys for social welfare and health care organizations in 2003, 2005, 2008, and 2011, commissioned by STM [16-19]. First the "Monitoring and Evaluation of Social and Health Care Information System Services" (STEPS) research project was funded by STM and coordinated by THL in 2014, followed by STEPS2.0 in 2017 and STEPS3.0 in 2020 [20]. This work resulted in a series of "Use of information and communications technology in Finnish health care" reports [21,22], with an upcoming report showing results for 2020. The purpose of the STEPS3.0 project is to find the availability and use of local and regional information system services, the functioning of national Kanta services, information exchange

between organizations, and the situation of services to citizens and electronic information management resources [20].

The state of information technology in Finnish health care has been compared also internationally. Studies of the development and impacts of health care information technology has been produced by the European Commission [23-27], the World Health Organization (WHO) [28-30], and the Organization for Economic Co-operation and Development (OECD) [31-33]. Larger monitoring between five Nordic countries has been carried out by the Nordic eHealth Research Network (NeRN) [34-37]. At the national level, there are also regional studies on the availability e-health services [38,39]. In addition, the usefulness, ease of use [40] and barriers of using e-health services [41] have been studied. However, previous studies have not published material covering different service sectors from Finland.

The present study investigated Finnish e-health services offered to citizens in specialized health care, primary health care, and a sample of private medical service providers. The aim is to provide information on the availability and national development of e-health services. This study used data collected in connection with the "Use of information and communication technology in health care 2020" (unpublished data) survey and previous surveys in 2011, 2014, and 2017 [19,21,22]. The main questions were as follows:

1. What different e-health services for citizens are offered by specialized health care, primary health care, and private service providers?

2. How has the availability of e-health services for citizens developed from 2011 to 2020?

3. How does the availability of these e-health services differ regionally?

Material and methods

This study was based on the "Use of information and communication technology in Finnish health care" survey data from 2011, 2014, 2017, and 2020. The focus was on the 2020 survey and the development of service availability was included when data from previous follow-ups were available.

The survey was conducted on Finnish public health care providers and a sample of private medical service providers. The target group of public health care providers included all 21 hospital districts for secondary health care and all organizations for primary health care, specified as independent municipalities or co-operation areas where the forms of organization are a consortium of municipalities or a responsibility model. The largest (based on the sales volume) private providers were included for the sample of private service providers and these were supplemented by smaller service providers that participated in earlier surveys.

Data collection and analysis

Survey data were collected using web-based questionnaires (Webropol©) during the first quarters of 2011, 2014, 2017, and 2020. Questions were kept comparable to questions from previous surveys and were updated to account for developments in ICT health care. The questionnaires were sent by e-mail to medical directors and IT leaders (CIOs) in specialized health care and chief physicians in primary health care. The questionnaires for private health care providers were targeted at chief executive officers (CEOs) or other contact persons. The functionality of the questionnaires

was tested before sending them to the receiver organizations.

Responses were compiled from the entire organizational level. In the hospital districts, where specialized health care providers were also responsible for the primary health care of the municipalities, only the questionnaire for specialized health care was sent. In these areas, the responses of the specialized health care providers were transferred to the surveys for primary health care. At the end of the official response time, unanswered organizations were reminded by email and telephone. Reply forms were checked and insufficient responses were completed by phone or email with respondents from the organizations.

This study covered all 21 hospital districts in 2011, 2014, 2017, and 2020. For primary health care, the response rate (number of organizations) was 86% (139/161) in 2011, 88% (135/153) in 2014, 86% (121/141) in 2017, and 96% (130/136) in 2020, resulting in population coverages of 91%, 95%, 95%, and 99%, respectively. The response rates of the private health care providers were 31% (30/97) in 2011, 45% (24/46) in 2014, 57% (26/46) in 2017, and 44% (12/28) in 2020, including actors operating as a concern. This variability in the number of participating organizations in primary care and private care between the survey years is due to changes in municipal health care arrangement models and the mutual mergers of private organizations, respectively.

Quantitative data were analyzed using SPSS software (version 25). The questionnaire was answered “yes” or “no”, and the availability of service was calculated as a percentage of all respondents in each sector. A total of 38 indicators were used in this study. Temporal comparisons were made for 30 indicators and 22 of them are shown in Figures 1 and 2. The remaining 16 indicators are presented in the text. The national comparison between health care sectors and the regional comparisons between hospital districts were described using 18 indicators. These were a selected subgroup from all 38 indicators. The selection was based originally on the list of indicators describing the e-health and e-welfare strategy 2020 (Appendix table 2 of the THL report “Use of information and communication technology in Finnish health care 2015”: Indicators describing the current situation with division of e-health and e-welfare strategy 2020, section “Citizen – Doing it yourself”) [21]. List of indicators were updated by professionals to reflect the 2020 data collection and they are specifically named in Figures 3 and 4.

Results

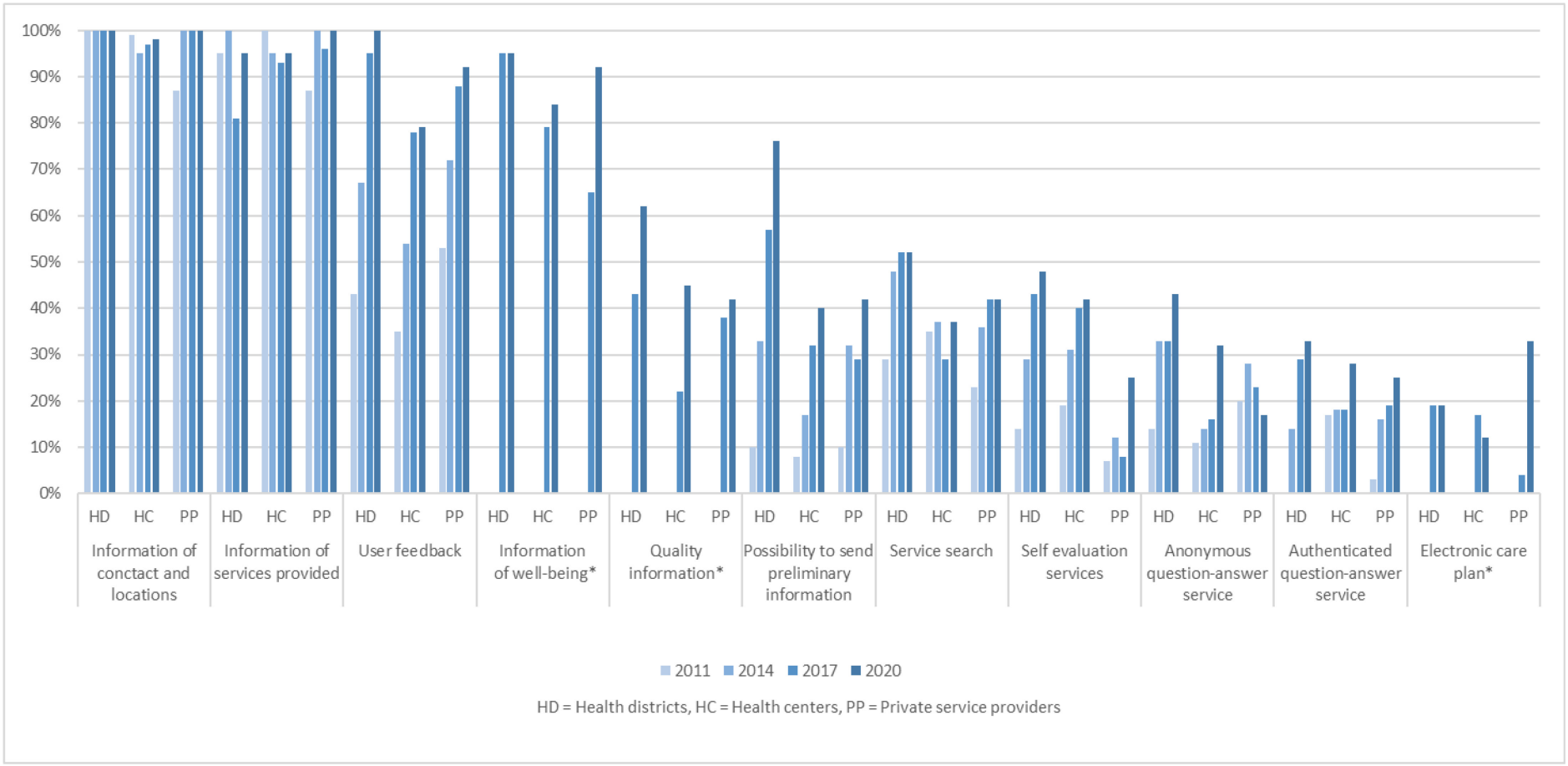
E-health services provided by organizations were divided into seven sections: services offered from the organizations’ websites, services for electronic appointment booking, information exchange between patients and professionals, access to health data, remote consultation, phone counseling, and services that receive patients’ own measurement data. These services and the development of their availability are described below. At the end of the results, a national comparison between service sectors and regional comparisons between hospital districts are presented.

Services offered from Websites

Figure 1 summarizes the services available on organizations’ websites sorted by organization type and year. This figure clearly shows that e-health services were offered extensively on the organizations’ websites and the availability of services on websites clearly increased during the follow-up period. Closer inspection of Figure 1 reveals that information on organization facilities (contact in-

formation and location) and provided services were extensively offered at all time points. The option to send electronic feedback clearly increased from 2011 to 2020 in all service sectors and was offered extensively in 2020. The availability of well-being information was also common in 2020 and increased from 2017 in health centers and private providers.

Terveyskylä's open services and Omaolo services linked to organizations' websites, as well as up-to-date information on the organizations' Kanta services, were first investigated in 2020. Terveyskylä's open services were linked to by 57% of hospital districts and 44% of health centers. 43% of hospital districts, 46% of health centers, and one private organization linked to Omaolo services. Up-to-date information on the organizations' Kanta services was offered by 38% of hospital districts, 37% of health centers, and 42% of private providers.


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
HD HC PP
Information of conctact and locations
Information of services provided
User feedback
Information of well-being*
Quality information*
Possibility to send preliminary information
Service search
Self evaluation services
Anonymous question-answer service
Authenticated question-answer service
Electronic care plan*
2011 2014 2017 2020
HD = Health districts, HC = Health centers, PP = Private service providers

Electronic appointment booking services

Figure 2 shows that the availability of direct online appointment booking increased in hospital districts since 2011 and was provided by nearly all hospital districts in 2020. Chancing or canceling booked appointments electronically was possible in 71% of hospital districts in 2020 (81% in 2017). In primary health care, the availability of direct appointment booking is growing (Figure 2), but changing or canceling booked appointments has remained at the same level as in 2017. It was used by more than half (55%) of health centers in 2020 (52% 2017). The most common use of direct online booking or changing of booked appointments was for laboratory services, maternity and child clinics, and nurse's consultations.

Short message service (SMS) was used for booking appointments in 43% of hospital districts in 2014, after which its use decreased. In 2020, it was used in 29% of hospital districts, the same percentage as in 2011. In primary health care, the use of SMS increased from 2011 (8%) to 2017 (30%). In 2020, it was used by almost a quarter (24%) of health centers. SMS appointment booking has been used mainly for doctor's consultations in public health care.

Figure 2 shows that private providers' use of direct appointment booking has increased since 2011. Also, the possibility to change or cancel booked appointments electronically has increased. It was offered in three-quarters (75%) of private providers in 2020 (54% in 2017). SMS appointment was used by half (50%) of private providers, which is less than in 2017 (62%). Usually, direct online booking, cancellation, and changes and SMS booking were used for doctor's consultation. Electronic chancing or canceling booked appointments was not investigated in 2011 and 2014.

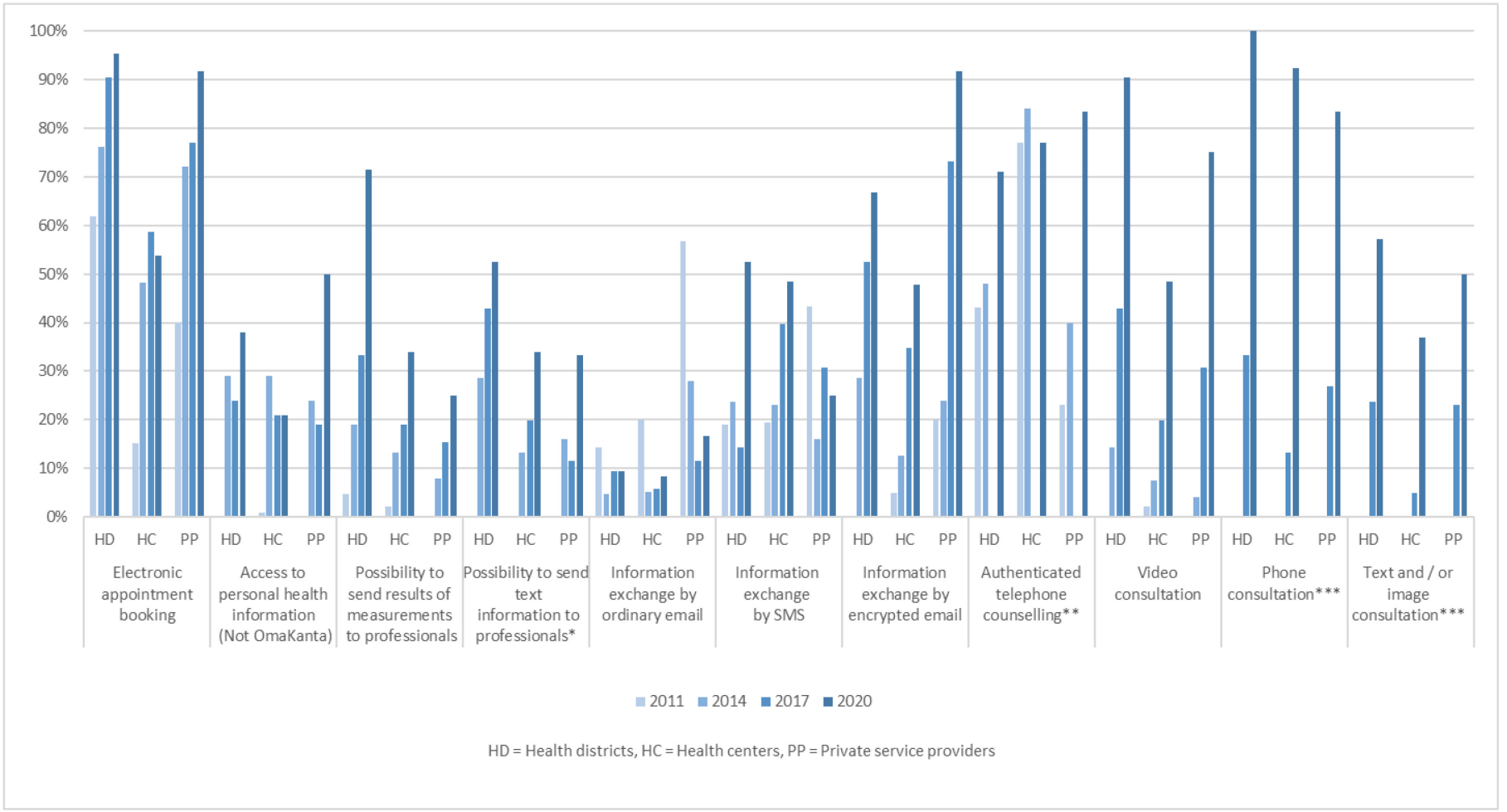


Figure 2. A summary of the available e-health services in specialized health care, primary health care, and a sample of private service providers. Not asked in 2011*, 2017**, 2011 and 2014***. Percentage indicates the proportion of organizations providing each individual service.

Information exchange between patients and professionals

The use of encrypted email to exchange information between patients and professionals has increased since 2011. At the same time, the use of ordinary e-mail has decreased. Figure 2 shows the development of these forms of communication and SMS communication sorted by organization type and year.

The availability of mobile health care applications and the use of public applications such as WhatsApp and Snapchat for information exchange were first asked about in 2020. Health care applications were used by two-thirds (67%) of hospital districts, a minority (12%) of health centers, and one-third (33%) of private providers. Public mobile applications were used in a minority of hospital districts (12%) and health centers (2%). Private organizations did not report using public applications.

Access to personal health data

National My Kanta Pages allows citizens to view personal health data electronically, but organizations can also offer access to health information through their own systems. Figure 2 shows the availability of services offered by organizations over time, not including My Kanta Pages. Closer inspection of the figure reveals an increasing trend in access to personal health data through organizations' own systems, especially in private service providers.

The option to view laboratory results through organizations' own systems has increased in specialized care. In 2011, no hospital district offered this option, while in 2020 it was offered by 29%. Medications could be viewed online in 19% of hospital districts in 2020, which is more than in 2017. Viewing electronic patient records (EPR) or imaging results was not widely available at any survey time point. It has been possible to view diagnoses in 10% of hospital districts since 2014.

In primary health care, the option to view laboratory results increased between 2011 and 2017. In 2020, it was offered by 17% of health centers which is slightly less than in 2017 (19%). Viewing EPR and imaging results was only possible for a few organizations in 2020, which is unchanged from previous years. Medications and diagnoses could be viewed in 13% and 8% of health centers, respectively, which are generally at the same levels as in 2014 and 2017. Four (33%) private providers offered the opportunity to view EPR, laboratory results, medications, and diagnoses in 2020. Online access to EPR and laboratory results has increased since 2011. Online access to medications and diagnoses was not investigated in 2011.

Remote consultation

Remote consultations can be arranged by phone, video, or text, and/or images. Figure 2 shows that the availability of each form of consultation has increased significantly in the public and private sectors. Closer inspection of the figure reveals that telephone consultation was the most common form of consultation and was used in all hospital districts, nearly all health centers, and most private service providers in 2020. Video consultations were also common in specialized health care and private providers. Text and/or image consultations are increasingly provided alongside phone and video consultations.

Phone services

As shown in Figure 2, the availability of authenticated telephone counseling has increased since 2011 in specialized health care and private service

providers. It was offered by almost three-quarters of hospital districts and more than four-fifths of private service providers in 2020. In primary health care, the available barely changed from previous years and was offered by almost four-fifths of health centers.

In 2020, 67% of hospital districts offered general anonymous health, sickness, and telephone counseling (29% in 2014 and 38% in 2011). In primary care and private providers, the availability of anonymous public telephone counseling has remained broadly unchanged since 2011. In 2020, it was provided in 54% of health centers and 42% of private organizations. The 2017 survey did not ask about the availability of anonymous and authenticated telephone counseling.

Patients' own measurement and text data

The availability of systems that receive information from patients has increased (Figure 2). Public organizations reported using remote measurement services for blood glucose measurement, monitoring peak expiratory flow (PEF), and blood pressure. Regional welfare services (Hyvis, Virtu.fi), services related to patient information systems (Lifecare, Self-care), and care-guidance systems such as Klinik were also used in 2020.

National comparison between service sectors in 2020

Figure 3 summarizes national results from 2020 and reveals that hospital districts generally cover the availability of e-health services more extensively than did primary health care and private providers. Private providers more often used encrypted email to exchange information with patients. They also offered access to personal health information through the organizations' own systems clearly more than did public health care organizations.

Regional citizen e-health service profiles

The results from 2020 show clear differences in the availability of e-health services between hospital districts (Figure 4). The Helsinki and Uusimaa hospital district was the only one that did not report information about services on their websites and Satakunta was the only one that did not offer information on well-being. Information on electronic appointments was missing only for the Central Finland district. All hospital districts offered the option for electronic feedback. The availability of e-health services was most extensive in Northern and Southern Karelia and Central Ostrobothnia.

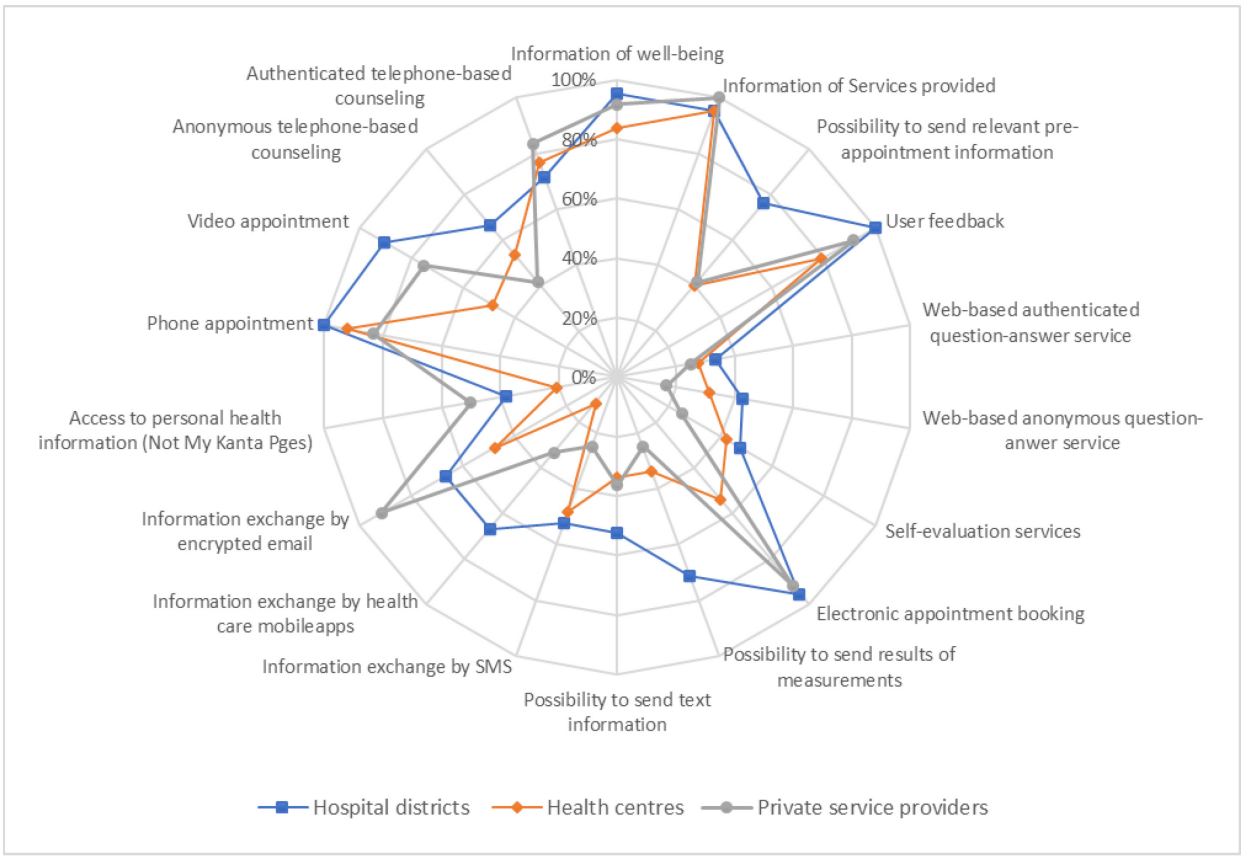


Figure 3. Profile of e-health services in hospital districts, health centers, and private providers in 2020. Percentage indicates the proportion of organizations providing each individual service.

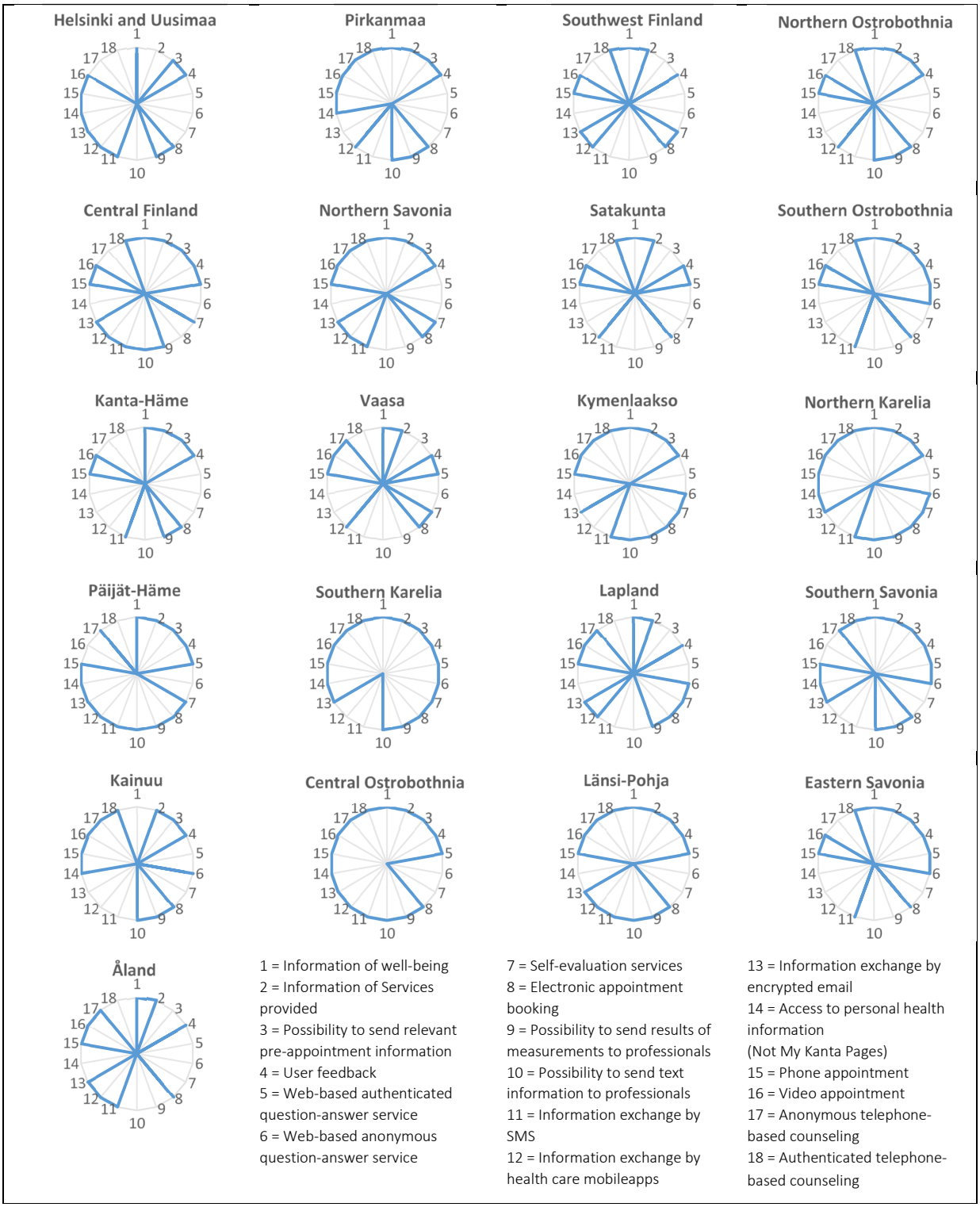


Figure 4. Profiles of e-health services in hospital districts in 2020. If the hospital district is providing one of the numbered services, then the colored line is extended to the perimeter of the diagram.

Discussion

The availability of e-health services for citizens has increased as per the national e-health strategy [4]. Regarding the first research question, it was found that e-health services were offered extensively on the organizations' websites. The results of this study suggest that almost all organizations have information about well-being, provided services, contact methods, and locations on their websites. The possibility to send electronic feedback and remote consultations by telephone are common in all service sectors. Electronic appointment booking was extensively offered, and this service has also been considered important by citizens [13,42]. There is still a need for improvement in the availability of e-health services to achieve the objectives of national health strategies [3,43]. For example, self-evaluation services, advice, and support services should be offered even more extensively [41].

Comparing the service sectors revealed that specialized health care provides e-health services most extensively. This result may be explained by the fact that e-health services have been developed and implemented in many collaborative projects with university hospital districts [6,11]. Private providers most often offered access to personal health information through the organizations' own systems. One possible explanation is that health information in the public sector is mostly available through My Kanta Pages [7,44]. Private providers may also want to develop their relationships with customers by maintaining their own mobile apps.

Regarding the second research question, it was found that the volume of services increased clearly from 2011 to 2020 in public health care and the sample of private providers. Remote consultation services, the option to send electronic feedback, electronic appointment booking services, and remote measurement services especially increased during the observation period in all service sectors. The results also indicate that information exchange between patients and professionals has become more secure because the use of encrypted e-mail has increased, although insecure methods such as ordinary e-mail are still in use. From an ethical point of view, it would be desirable to remove insecure methods. In the Nordic comparison, Finland has been a pioneer in the introduction of systems that receive information from patient [36]. However, the availability of electronic appointment services in public health care has increased more slowly than in Denmark and Sweden [36].

Increased availability of the services can be explained by the implementation of the national e-health strategy [3] and the fact that projects developing e-health services have received funding [9,11]. Another possible explanation for this increase is that organizations consider e-health services to be useful in their own operations. The success of electronic services in other industries has promoted the use of e-health services in health care as well. However, despite the national strategy, each organization decides independently on the deployment of services, leading to different stages of progress in the availability of services.

Very little was found in the literature on how the availability of e-health services differs regionally. Regarding regional differences, this study found that the availability of e-health services varied considerably between hospital districts. These results also accord with earlier observation [41]. These differences may be due to a lack of common guidelines for priorities in the development and implementation of e-health services [3,45]. Much of the development of e-health services has only

been implemented regionally in municipalities and hospital districts [6,9,11,46]. For instance, the extensive availability of e-health services in Karelia is due to the districts' own strategies, and other electronic health care services have also been developed more widely [22,46].

From a national point of view, it seems that there is a lot of overlap in the development of the services [3,45]. For instance, self-evaluation services are provided from several different sources. The question raised by this study is: could e-health services be harmonized so that all services can be found on the same platform for all citizens. What is now needed is to clarify national and regional development responsibilities and standardize the availability of e-health services within and between hospital districts to ensure that strategic objectives are met. Indicators are needed to follow up on the achievements of health strategies. International comparisons can also guide national development. A further study could also assess the impact of the coronavirus pandemic on the availability of e-health services.

Strengths and limitations

The strength of this study is that it provides a comprehensive sample of public organizations. This improves on European studies in which only a small sample of organizations from each country participated [47]. The sample of private responders is small and varies between survey years, so the results for private service providers are not directly comparable. Despite this limitation, the study adds to our understanding of the services provided by private service providers in Finland, as the largest actors are included in the sample. There were also minor changes in the formulations of the questions throughout the years, but comparisons were possible.

Ethical considerations

This study followed responsible conduct with the guidelines of the Finnish Advisory Broad on Research Integrity [48]. Respondents were informed of the study and they answered as representatives of the organizations being studied. Sensitive personal information was not collected. The data were processed and stored in a secured environment according to the procedures of the University of Oulu.

Conclusion

This study provides the first comprehensive assessment of the long-term national development of the availability of e-health services for Finnish citizens. The study has shown that Finnish health care services for citizens are extensively digitalized, and the volume of e-health services increased from 2011 to 2020 in public health care and a sample of private providers. The research has also shown that specialized health care more extensively offers e-health services than primary health care and private service providers. No hospital district offered all studied e-health services and the availability of the services varied considerably between hospital districts. These findings have significant implications for understanding how the availability of e-health services has developed and the differences between hospital districts and service sectors.

The findings of this study have several important implications for future practice. The results can be used to target interventions for developing the availability of e-health services, reducing disparities in the availability of e-health services between hospital districts and between service sectors, and giving information on national developments. Because e-health services are seen as important for achieving strategic goals to design personalized

health care and improve cost-effectiveness and quality of care, indicators for the follow-up of e-health services are needed. Further research is required to assess the achievement of these strategic goals and expectations.

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Declaration of conflicting interests

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