

Title: The present and future of eHealth in Spain from a health management perspective

Running head: eHealth in Spain, the management view

ABSTRACT

Objective: eHealth has grown significantly over the last decade. The aim of this study was to determine the level of use of information and communication technologies for healthcare in Spain and identify the main barriers to development.

Methods: Qualitative study based on data obtained from eight Spanish autonomous communities through semi-structured, in-depth interviews with key informants in eHealth management and planning.

Results: Programs present varying degrees of implementation. Services such as electronic prescriptions, digital medical records or appointment requests via the Internet are very advanced and widespread; others, such as digital imaging, are advanced but not fully deployed; and some, such as telecare programs, are experimental. The study also revealed diverse levels of interoperability and barriers to the expansion of these technologies, which can be classified into four fields: technological, organizational, human and economic.

Conclusions: eHealth might evolve more slowly in the coming years. Unless the payoff is clearly seen, major budget cuts in the current economic climate will prevent the implementation of new projects. Programs that help reduce

health spending are more likely to be implemented, to the detriment of projects involving simple techniques or even clear healthcare improvements.

KeyWords: Information and communication technologies, eHealth, Telemedicine, health system.

1. BACKGROUND AND SIGNIFICANCE

Despite the effects of economic crisis¹ and more restrictive immigration laws since 2012,² Spain's public healthcare system is still considered universal in the most classic sense: it is freely accessible, equitable, and funded through taxes. In this highly decentralized system, the state coordinates health policy but the administrations of the regional Autonomous Communities (ACs) are responsible for providing health services¹.

Innovations in data processing and transmission have advanced the provision of public health services.³ When information and communication technologies (ICTs) and platforms are applied to health services,⁴⁻⁷ we refer to it as eHealth.⁸⁻

12

Although technological innovations have benefitted health services,¹³⁻¹⁶ guidelines and implementation speeds¹⁷ vary significantly within the decentralized Spanish context. The ACs have their own rhythms for developing healthcare technology programs, and some lack implementation.¹⁸⁻²³

i Spanish 1978 Constitution states the role of central public administration (149, 16) and regional administrations (Art 148, 21) regarding health services. Art 149,16 also states the coordinating role by the central administration in relation with health system. Law 16/2003, of May 28th, on cohesion and quality of the National Health System, describes the role of the Interterritorial Council as a coordinating organization, giving it a new composition and functions. That law also describes a common framework for the delivery of services by regional administrations: health benefits; pharmacy; human resources; research; Information systems; quality of the health system; comprehensive plans; public health; participation of citizens and professionals. Although upon this general framework regional e-health plans have evolved by their own they also have had to fulfill commitments like the development of a common framework for electronic health records. See: https://www.msrebs.gob.es/organizacion/sns/planCalidadSNS/docs/HCDSNS_English.pdf

2. OBJECTIVES

The objective of this study was to describe and explore the eHealth situation in Spain, basing the research on the experiences and perceptions of informants who are involved in the management and planning of health services in their respective ACs. We analysed the phase, progress and prospects of several eHealth platforms, along with the barriers they encounter.

3. SUBJECTS AND METHODS

In order to gather opinions on the implementation of ICTs in the health field, a qualitative study based on focus groups in eight ACs. Previous research by those responsible for ICT development programs in these regions informed the selection of the regional health services included in this study.²⁴ In this analysis, we also looked at the progress, benefits and functions of eGovernment programs, along with access to regional health service web platforms. The survey results were combined with AC variables such as population, time since competence in health matters was assumed and the legal framework for developing eHealth²⁴. The eight Autonomous Communities showed average values for each aspect of the analysis.

Each of the focus groups was composed of six to eight health managers and was created on site in their respective facilities and health services in Catalonia, Aragon, Madrid, Andalusia, Extremadura, Galicia, the Basque Country and

Valencia. The interview sessions followed a structured script, were conducted by two people with experience in the technique and were audio/video recorded. Healthcare management professionals were selected according to the type of tasks they performed, their role on the health organization panel in their area of competence, and their experience in applying ICTs to their sector. The sample design and selection of participants were established *a priori* (intentional sampling) to choose individuals who fit the role described^{25,26}. A list of informants was prepared and subsequently revised by two independent, external experts who were asked to validate the names on the list and make suggestions. After contacting the informants, the eight focus groups met in their workplaces during the first semester of 2018. The sessions were audio-recorded and transcribed in their entirety. The duration of the sessions ranged from 51 to 92 minutes, with an average of 68 minutes, generating a total of 1,440 minutes of recording and 248 pages of full transcription. The content from the focus groups was then coded and analysed, using Nvivo 11 software to create analysis categories that reflected participant emphasis on specific topics (see Annex).

4. RESULTS

4.1. Levels of eHealth development in Spain: programs with advanced implementation

Programs to schedule an appointment via the Internet are the most fully implemented eHealth initiatives in Spain, followed by digital medical records

(DMR), electronic prescription and the digitalization of images. Telemedicine, in contrast, is still in a very early stage of development.

a) Making an appointment for General Practice (GP) or Pediatrics via Internet

Online services to request an appointment for GP and Paediatrics is widely implemented in the Autonomous Communities, though levels of use vary notably. This was dependent on the time elapsed since implementation (more intensive use in the territories where it has been operating for the longest time and where resistances to change or lack of training in the use of ICT were both overcome by healthcare professional); the geographical distribution of the population (higher use in territories with more densely populated urban centres; the age and educational level of the users (more frequent use by younger and more educated population); and the ability to connect to the network (availability of an adequate connectivity infrastructure increases use) (Table 1, INT 1, 26, 33, 35, 42).

However, the Internet is still not the most prevalent way of scheduling an appointment, as security of access remains a handicap (Table 1, INT 3, 37, 38, 42, 43). Users still prefer to make appointments in person at the medical centre or by telephone.

b) Digital Medical Records (DMR)

Our findings indicate that DMR is fully implemented in primary care and emergency services, but not in secondary care. The ACs have different rhythms for its development and practical use. In some cases, DMR is integrated into a common system for different levels of care; in others, there are separate DMR platforms for primary care and specialized care. This creates a barrier to the coordination and exchange of information among health systems, which can affect service.

Short-term expectations are that patients will be able to easily and safely access their DMR, that DMR will be more interactive and that the users themselves will be able to introduce some data. Currently, a patient requires a digital certificate to access DMR in most of the autonomous communities. This makes the process much more complex, especially for those less skilled in ICT use (Table 1, INT 38, 43).

c) Electronic prescription

Electronic prescription, which includes both prescribing and dispensing pharmacological products, is in an advanced stage of implementation (Table 1, INT 11, 31). It is fully operative in primary and emergency care, though somewhat less so in secondary care. However, it is expected to be widely implemented at all levels in the near future, even in territories where it was introduced more recently.

Dispensing medications digitally has progressed more slowly because it does not depend exclusively on public health services and requires the collaboration

of pharmacies or chemist shops. Currently, several ACs allow medication to be retrieved in a different community to that in which it was prescribed. Success in this area will depend on collaboration.²⁷

d) Digitalization of images

Digitalized images can be consulted and reported on remotely. This eHealth service is also widely implemented but still very limited to radiology. In most of the ACs, other types of images are slowly being incorporated also (Table 1, INT 30, 44).

Again, implantation of this technology is greater in primary care. Along with x-rays, some radiology facilities are beginning to scan ultrasounds, CT scans MRIs, spirometry, retinography and images from nuclear medicine.

4.2. Levels of eHealth development in Spain: programs with moderate implementation

Some programs are not fully operative but have high potential for greater implementation, such as shared digital clinical records or the digitalization of any type of image.

a) The future regarding digitalization of diagnostic images

Digitalization of diagnostic images was a priority among the health services consulted. It reduces travel costs for users and professionals (Table 1, INT 2), as well as expenses derived from file management and image transfers. The hardware available at present is obsolete and new equipment is required to

capture, store and convert digital images for use and review by members of the health system. Much more than technology or human resources, however, economic conditions are the main barrier to implementation (Table 1, INT 4, 14, 25, 39).

Digitalization of all images would make the health system safer. It could reduce costs in the long term, generate useful information for diagnostic decision-making and significantly enhance the usefulness of medical records (Table 1, INT 5, 32).

b) Shared digital medical records (DMR)

Unified DMR is a project managed by the Ministry of Health. It seeks to establish a minimum data set for patient medical records in all regional health systems, which would be transferred to a common database that could be accessed from anywhere in Spain. The ACs have varying levels of involvement in this project for political, economic and even structural reasons, including co-official languages or the organizational models of their health services.²⁸

The project seems to require much stronger leadership and political involvement than what the current situation provides. Our findings indicate a shared opinion, especially among ACs with co-official languages, that only a ‘minimal shared record’ would be admitted. Though this first step of a minimal medical record has been achieved, the interviewees expressed that this, combined with the lack of economic resources for carrying out the project, should justify more decisive political action. (Table 1, INT 28, 29, 30, 44).

c) Patient access to the digital medical record (DMR)

Patient access to the DMR – a kind of personal health folder that happens to be a first output of the system – was perceived as an interesting tool by the interviewees, especially as a means of empowering patients (Table 1, INT 24, 34). Currently, DMR can only be accessed in some ACs but not with the individual's national identity card (DNI) or health ID card. Instead, the user must acquire an electronic certificate. For users it's difficult to obtain this certificate: they must request it on line through certain certification authorities; then the procedure differs depending on whether the certificate is purely computer-based or has the form of a card; in either of the two cases, it is compulsory to prove user's identity at a registration office. Finally, if it is a computer based certificate, the user must download it from the certification authority website. Furthermore, the current platform does not allow users to interact with medical professionals.

d) Telemedicine projects

Despite the existing barriers (Table 1, INT 15), telemedicine can make the health system more efficient and economically sustainable while also promoting greater patient proactiveness (Table 1, INT 23) regarding their health (Table 1 INT 6-8).

The professionals interviewed believe that it is difficult for synchronic processes (telepsychiatry, telecardiology and telemedermatology, especially with patients in penitentiary centers or rural areas) to advance, because they

require the use of multiple resources simultaneously to serve a single user. They believe that asynchronous processes have greater potential (forwarding medical tests from primary to specialized care for deferred diagnosis), specially programs that present a good ratio of return on investment.

4.3. The potential and immediate future of eHealth in Spain

Managers consider that eHealth is advancing at a good pace in Spain, highlighting especially the increased quality of care (Table 1, INT 9-13) and improvements in accessibility, efficiency and effectiveness. Specifically, they mentioned savings in terms of printing, custody, storage and transfer of diagnostic tests or prescriptions, which had led to unnecessary processes in the pass.

Managers appreciate how automation benefits physicians and consumers by avoiding repetition of tests, strengthening the accuracy of diagnoses with information from different care providers and minimizing interactions of pharmacological prescriptions. They also observe that the enormous amount of data the programs store (big data) can improve information on disease prevalence and facilitate better knowledge of patients through the creation of patient profiles.

When asked about the future of eHealth, the informants agreed that there is a vast range of unexplored areas with great potential for development (Table 1, INT 16-24). They expressed that future efforts should be directed at improving DMR, managing chronicity, promoting interoperability and coordination,

increasing the development of remote support and standardizing professional practices.^{29,30}

Those interviewed indicated that eHealth was positive for advancing consumer empowerment and proactivity in the supervision of their own health. However, they pointed out that while this objective can be achieved by providing the consumer with more communication channels and more information, it can have the adverse effect of giving them excessive responsibility for their own state of health.

Similarly, the interviewees did not think that security protocols had yet been developed to adequately guarantee the protection of patient data. They also noted the importance of clarifying to the users how their data will be used, as it is valuable for health research (Table 1, INT 36, 40, 41, 43). Finally, the experts specified that performance assessments for eHealth programs should be intensified and redesigned.

5. DISCUSSION

Our work shows that Health managers see progress in the implementation of eHealth in Spain. Nevertheless, there is still a long way to go when it comes to standardizing the most common programs, promoting interoperability and implementing other applications ('m-Health' mobile phone applications,³¹ expanding telephone-based models for care and assistance).

Compared to earlier data from the World Health Organization^{32,33} corresponding to the beginning phases of several eHealth programs, the participants in this study indicated that programs have developed, and that significant progress has been made.

Significant intergroup variability was detected in eHealth development among regions,³³ along with intragroup variability, indicating different levels of implementation within the same territory. This diversity stems from the priority given to health on the political agenda of each AC. The multiple stakeholders involved in coordination and interoperability significantly impacted the findings, as did the demographic features of the territories, integration of the health system, funding, etc.

Despite the variation between regions, however,¹⁸⁻²³ some common patterns emerged across territories. Significantly, interaction between consumers and the health administration is generally low. In fact, requesting an appointment with the GP via Internet was the most commonly used tool, and appears to be the only interactive service currently provided by all the regional health services.

Use of the technological applications offered on public service websites was low, indicating that consumers do not take full advantage of their functions. Similarly, feedback regarding health and e-services was especially lacking.³⁴

The authors note that the implementation of new projects is linked to the likelihood of return on investment.^{35,36}

Based on the study findings, the main obstacles to implementing eHealth³⁷ are insufficient economic resources,⁵ technical difficulties arising from the difficulty of accessing confidential data, insufficient interoperability,³⁸ a weak culture of consumer empowerment and lack of equity for groups at risk of exclusion. To overcome the current barriers,³⁹ it is important to create a favourable context for the development of eHealth.^{32,35,40}

The data collected confirmed that telemedicine (and all its possible subfields such as teledermatology, telepsychiatry and telepathology⁴¹) does not seem to be a priority for managers, despite its potential. Health management priorities are instead focused on advances in DMR, digitalization of images and generation of shared files (PACS, Picture Archiving Communication Systems).

6. CONCLUSIONS

Implementation and development of ICTs for eHealth in Spain is advanced but uneven. The participants in this study indicated this to be a result of the position eHealth occupies on the political agenda of each AC government and the perceptions of these governments concerning the need for coordination.

Programs such as online requests for an appointment with a GP or nurse, digital medical records (DMRs) and electronic prescriptions are operating at a very high level of implementation. Others, such as digital imaging and sharing DMRs, are underdeveloped. Digital imaging programs are used almost exclusively as radiology tools, which limits the benefits that could be derived from other uses.

The future does not look bright for telemedicine programs, which have only been implemented as very specific projects and pilot schemes in Spain. The lack of evaluation regarding the return on investment, the lack of strong leadership to encourage program design and implementation and the lack of commitment to overcome implementation barriers can be considered the key threats to the future development of eHealth.

CLINICAL RELEVANCE STATEMENT

Based on the contributions of the focus groups of health managers in the Spanish health system, this research provides knowledge about the main eHealth programs and projects, the pioneering role of supporting organizations in the field and perspectives on future development.

PROTECTION OF HUMAN AND ANIMAL SUBJECTS

No identifications have been included in this study.

CONFLICT OF INTEREST

None declared.

FUNDING

The author(s) have received financial support for the research, authorship, and/or publication of this article as part of the activities included in the research project: “Brecha digital e inhibidores en la implementación del e-Gobierno. Especial impacto en el ámbito de la salud” (CSO2014-53014-R) (2015-2018), financed by the Ministerio de Economía y Competitividad (Programa Estatal de

Investigación, Desarrollo e Innovación Orientada a los Retos de la Sociedad,
Convocatoria 2014).

REFERENCES

1. Nombela-Monterosoi K, González-Chordá VM, Roman P. Descriptive study of the Specialized Care of the Spanish Health System. *Rev Saúde Pública.* 2018;52(5). doi:<https://doi.org/10.11606/S1518-8787.2018052000289>
2. Urtaran-Laresgoiti M, Fonseca Peso J, Nuño-Solinís R. Solidarity against healthcare access restrictions on undocumented immigrants in Spain: the REDER case study. *Int J Equity Health.* 2019;18(1):82. doi:[10.1186/s12939-019-0971-9](https://doi.org/10.1186/s12939-019-0971-9)
3. Ramos V. Las TIC en el sector de la salud. *Bit.* 2007;163:41-45. [http://files.tic-en-la-salud5.webnode.es/200000009-4934f4b28e/LAS TIC EN EL SECTOR DE LA SALUD.pdf](http://files.tic-en-la-salud5.webnode.es/200000009-4934f4b28e/LAS_TIC_EN_EL_SECTOR_DE_LA_SALUD.pdf).
4. Eysenbach G. What is e-health? *J Med Internet Res.* 2001;3(2). doi:[10.2196/jmir.3.2.e20](https://doi.org/10.2196/jmir.3.2.e20)
5. Ahern DK, Kreslake JM, Phalen JM. What is eHealth (6): perspectives on the evolution of eHealth research. *J Med Internet Res.* 2006;8(1). doi:[10.2196/jmir.8.1.e4](https://doi.org/10.2196/jmir.8.1.e4)
6. Pagliari C, Sloan D, Gregor P, et al. What is eHealth (4): a scoping exercise to map the field. *J Med Internet Res.* 2005;7(1). doi:[10.2196/jmir.7.1.e9](https://doi.org/10.2196/jmir.7.1.e9)
7. Della Mea V. What is e-Health (2): The death of telemedicine? *J Med Internet Res.* 2001;3(2). doi:[10.2196/jmir.3.2.e22](https://doi.org/10.2196/jmir.3.2.e22)
8. World Health Organization (WHO Global Observatory for eHealth).

- mHealth: new horizons for health through mobile technologies. 2011.
https://www.who.int/goe/publications/goe_mhealth_web.pdf.
9. European Union. La salud electrónica – hacia una mejor asistencia sanitaria para los ciudadanos europeos: Plan de acción a favor de un Espacio Europeo de la Salud Electrónica. COM/2004/0356 final. 2004.
<https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=CELEX%3A52004DC0356>.
 10. European Union. Plan de acción sobre la salud electrónica 2012-2020: atención sanitaria innovadora para el siglo XXI. COM/2012/0736 final. 2012.
<https://eur-lex.europa.eu/legal-content/es/TXT/?uri=CELEX%3A52012DC0736>.
 11. Ministerio de Sanidad y Consumo. Plan de Calidad para el Sistema Nacional de Salud. 2010.
<https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/pdf/pncalidad/PlanCalidad2010.pdf>.
 12. Mars M, Scott RE. Global e-health policy: a work in progress. *Health Aff.* 2010;29(2):237-243. doi:10.1377/hlthaff.2009.0945
 13. Piette JD, Lun KC, Moura Jr LA, et al. Impacts of e-health on the outcomes of care in low-and middle-income countries: where do we go from here? *Bull World Health Organ.* 2012;90:365-372.
 14. Geissbuhler A, Al Shorbaji N. Establishing an evidence base for e-health: a call for papers. 2011.
 15. Black AD, Car J, Pagliari C, et al. The impact of eHealth on the quality

- and safety of health care: a systematic overview. *PLoS Med.* 2011;8(1):e1000387.
16. Kummervold PE, Chronaki CE, Lausen B, et al. eHealth trends in Europe 2005-2007: a population-based survey. *J Med Internet Res.* 2008;10(4).
 17. Carnicero J, Rojas D. *Application of information and communication technologies for health systems in Belgium, Denmark, Spain, the United Kingdom and Sweden.* (Division. UNEC for LA and the CSD, ed.). Naciones Unidas, CEPAL; 2010. <https://repositorio.cepal.org/handle/11362/6176#.XYi63spxHs.mendel ey>.
 18. Sociedad Española de Informática y Salud (SEIS). Las CC AA informan: La gobernanza de las TIC en salud en Cataluña. 2013.
 19. Ruiz MÁM, Morón ADB, i Canosa JC. eSalud en el SESCAM: el modelo de Castilla-La Mancha. *I+ S Rev la Soc Española Informática y Salud.* 2011;(87):7-15.
 20. Moya F, Garcia-Cuyàs F, Mañach J. eSalud, una herramienta al servicio del cambio de modelo asistencial. *Rev I+ S Informática y Salud.* 2013;97.
 21. Gobierno Vasco (Osakidetza). Nuevo modelo de provisión de Euskadi: Sistemas Locales Integrados de Salud Microsistemas y su gobernanza. 2012. http://www.osakidetza.euskadi.net/r85-pkron01/es/contenidos/informacion/estrategia_cronicidad/es_cronicos/adjuntos/gobernanza_web_oficina.pdf.
 22. Xunta de Galicia (SERGAS). Estrategia SERGAS 2014. La sanidad

- pública al servicio del paciente. 2012.
http://www.sergas.es/Docs/Conselleria/Estrategia_Sergas_2014.pdf.
23. Felipe LR. Las TIC en el Servicio Canario de Salud. *I+ S informática y salud*. 2013;(100):12-13.
 24. González Medina M, Bouzas Lorenzo R, Mahou Lago XM. El impacto de la producción normativa en el desarrollo y la capacidad de servicio de la e-Salud en España. *Rev Estud políticos*. 2013;(162):199-222.
 25. Popay J, Rogers A, Williams G. Rationale and standards for the systematic review of qualitative literature in health services research. *Qual Health Res*. 1998;8(3):341-351.
 26. Cerdà JCM, Rodríguez MAP, García MH, Gaspar OS. Técnicas cualitativas para la investigación en salud pública y gestión de servicios de salud: algo más que otro tipo de técnicas. *Gac Sanit*. 1999;13(4):312-319.
 27. Mahmud AJ, Olander E, Eriksén S, Haglund BJA. Health communication in primary health care-A case study of ICT development for health promotion. *BMC Med Inform Decis Mak*. 2013;13(1):17.
 28. Aleixandre-Benavent R, Ferrer-Sapena A, Peset F. Informatización de la historia clínica en España. *El Prof la Inf*. 2010;19(3):231-239.
 29. Yellowlees P. Successful development of telemedicine systems-seven core principles. *J Telemed Telecare*. 1997;3(4):215-222.
 30. Lessing K, Blignault I. Mental health telemedicine programmes in Australia. *J Telemed Telecare*. 2001;7(6):317-323.

31. Littman-Quinn R, Mibenge C, Antwi C, Chandra A, Kovarik CL. Implementation of m-health applications in Botswana: telemedicine and education on mobile devices in a low resource setting. *J Telemed Telecare*. 2013;19(2):120-125.
32. World Health Organization. Atlas - eHealth country profiles. 2011. http://www.who.int/goe/publications/ehealth_series_vol1/en.
33. World Health Organization (WHO Global Observatory for eHealth). *Atlas of EHealth Country Profiles: The Use of EHealth in Support of Universal Health*. Vol 3. World Health Organization; 2016. https://www.who.int/goe/publications/atlas_2015/en/.
34. Mahou Lago XM, Bouzas Lorenzo R. Atención al usuario y comunicación en los portales web de salud autonómicos en España. *Gestión y Análisis Políticas Públicas*. 2012;(8).
35. Mahtani Chugani V, Martín Fernández RL, Soto Pedre E, Yanes López V, Serrano Aguilar P. Implantación de programas de telemedicina en la sanidad pública de España: experiencia desde la perspectiva de clínicos y decisores. *Gac Sanit*. 2009;23(3):223-e223.
36. Roig F, Saigí F. Barreras para la normalización de la telemedicina en un sistema de salud basado en la concertación de servicios. *Gac Sanit*. 2011;25(5):397-402. http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S0213-91112011000500010&nrm=iso.
37. May C, Finch T, Mair F, et al. Understanding the implementation of

complex interventions in health care: the normalization process model.

BMC Health Serv Res. 2007;7(1):148.

38. Senor IC, Alemán JLF, Toval A. Gestión del control de acceso en historiales clínicos electrónicos: revisión sistemática de la literatura. *Gac Sanit.* 2012;26(5):463-468.
39. Van Panhuis WG, Paul P, Emerson C, et al. A systematic review of barriers to data sharing in public health. *BMC Public Health.* 2014;14(1):1144.
40. Gabarrón E, Fernández-Luque L. eSalud y vídeos online para la promoción de la salud. 2012.
41. World Health Organization (WHO Global Observatory for eHealth). Telemedicine – Opportunities and developments in Member States. 2011. http://www.who.int/goe/publications/ehealth_series_vol2/en.

Table 1. Opinions of the participants

Accessibility	<p>(INTERVENTION 1) “The patient has different access routes where previously he or she had one.”</p> <p>(INTERVENTION 2) “[with] ICTs the patients don’t move, they can access certain services from home.”</p> <p>(INTERVENTION 33) “But we can’t actually say that it is used massively or anything of the sort, rather we could say that it is a small group but that things are moving to increase access, so long as we incorporate more services and so long as we simplify, as we commented earlier, the level of access. One obstacle has been the use of the digital certificate, which perhaps has – in the name of more secure access – has complicated things and made it more clumsy for the citizen to open their file depending above all on their age or educational level or whether they use ICTs in their daily life. This is behind the interest in empowering projects like the personal health file and incorporating other forms of access, with usernames and strong passwords and without the need to use digital certificates.”</p> <p>(INTERVENTION 35) “So we are presupposing something that is not always true and even less so when welfare is</p>
----------------------	--

declining: we are presupposing that everyone has internet, that everyone has a computer, that everyone can pay for connection and we forget that access to networks are expensive, that you don't get a decent connection for less than 40 euros per month. I think that economic factors also influence here. Then elderly people have an educational issue because their thinking is obviously not structured [in this way] so unless you make a very simple and very intuitive product, they aren't going to use it. Then there is another issue: speed.”

(INTERVENTION 37): “[Regarding people with functional diversity and their difficulties] I think that society is sensitive to this topic, I think that technology has made it possible, research in this field allows you to advance in others, that by making it possible for a person with disabilities to use technology, you make it possible for them to have great quality of life, somehow it advances research so that these things you do to benefit a person with disabilities then have repercussions in the rest of society, because it has required you to re-think things as I say it, and what benefits some citizens can later be applied to the rest. I believe that efforts have been made, I believe it is already evident that

	<p>technology can give so much to these citizens. People who have eye problems, thanks to gadgets and such can communicate, can use voice recognition, use keyboard commands, braille... In this sense, I think that technologies can help immensely. And they are not barriers, they are enablers.”</p> <p>(INTERVENTION 42) “Access is not only when we think in terms of professionals we think that we are referring exclusively to a doctor, no, it’s doctors, nurses and other professionals such as psychologists, social workers and of course administrative personnel in administrative functions who are included in the system and then the citizen, well, a little to the degree that we offer services, right now any situation by internet we even put that what’s happening is that the truth is that it hasn’t been well received because everything that requires, and this is a topic we will surely have to revisit one day, everything that requires the use of an electronic certificate by the user has a lot of limitations when it comes to usability.”</p>
Security	<p>(INTERVENTION 3) “The compulsory security makes it difficult for the user to access health services.”</p>

(INTERVENTION 4) “Professional-oriented tools are developed more than user-oriented tools.”

(INTERVENTION 5) “There is greater security in the diagnostic tests, which results in safer diagnoses.”

(INTERVENTION 27) “and also as I would emphasize because of the sensitivity of health information, the law, the LOPD [Organic Law on Protection of Personal Data], the national security strategy and all the restrictions for example. One example, to comply 100% with requirements such as the LOPD or the national security scheme one of them requires to change your password every so often, and this is already a barrier, it’s something the user rejects, for the professional who has to work every day with the application and if for example every two or three days you have to change your password you create this small gap to give an example.”

(INTERVENTION 32) “It is not only the use of ICTs as a complement to management and processing or as a tool that can help me organize treatments, have information securely recorded, but it is a tool that should serve to change our model of care. Not only in terms of efficiency level but also of quality, fewer tests, more safety for patients and also an

instrument that will allow us to analyse this information and therefore evaluate it and act accordingly, improving citizen service which is the main objective.”

(INTERVENTION 36) “It’s just that sometimes there is rigidity that I think that for statistical monitoring and such, there are things that make research more difficult and this somehow affects the public good. I mean I think that access to private information should be regulated when the result of the research benefits the population, of course by principles of good use, not for a pharmaceutical company that wants to benefit by knowing if its drug is the most used or not and by whom. This for me would be illicit use, but use of research that seeks to determine if survival rates are better with one drug or another, if you can demonstrate that this is applicable to the entire population, would be legitimate, but [access should] not just [be for] anyone, like when I get home and find letters from companies they’ve given my data to, it even gets a little Kafkian.”

(INTERVENTION 38) “Yes, the topic of citizen identification in healthcare, use of the digital certificate is an important barrier, a significant barrier and at present there

aren't many alternative methods that allow you to get around it.”

(INTERVENTION 40) “Yes I think that, you know, the guarantees citizens require in these cases can sometimes be a barrier, but it is also true that citizens have a right to demand them. It is quite another thing that we have to work first to comply with them and sometimes also to properly inform the citizenry so that certain misgivings disappear though it is also true that of course if there is misuse of [data] for example when you get companies that sell information for example addresses or things like that, then of course this creates mistrust, then as usual misuse of things does a lot of damage and innocent people pay the price.”

(INTERVENTION 41) [Regarding whether the interviewee believes that citizens doubt whether their information is secure] “No, I don't think so. (...) But it is another thing when they ask for identification information or ... but I mean, for example in the use of electronic access, or digital access to your clinical history data etc., that they perceive it as a threat to the security of their information, I don't really think so.”

(INTERVENTION 43) “Yes I believe that the problem when we are talking about systems as in other areas is to find the

	<p>right balance between security and functionality. Security at this moment in many cases requires us to use electronic certificates, which at the professional level I think it is logical to use the electronic certificate at the professional level for two reasons, first well to guarantee authenticity but also because you sign a lot of actions and then the way to sign electronically is with the certificate.”</p>
<p>Efficiency</p>	<p>(INTERVENTION 6) “Requesting an appointment via Internet and appointment reminders via SMS result in considerable savings for the system.”</p> <p>(INTERVENTION 7) “The fact that you do not lose tests and do not have to repeat them is already cost saving.”</p> <p>(INTERVENTION 8) “In those times we could say there were 100,000 mental health consultations, and you ask yourself: ‘and, how is that going?’”; ‘Since last year have we gone up? down?’ But now I know if they are schizophrenias, depressions, syndromes or whatever; I mean, that I know what groups of pathologies we are seeing to inform where I need to go.”</p>

(INTERVENTION 30) “There’s also the advantage of efficiency. Implementing those systems has helped us be much more efficient, both in the process and in physical things. For example, we no longer print radiology images, unless the patient needs them or takes them to a place where there is no technology for reading them, in theory we are avoiding the economic and ecological cost, in this sense I think that the impact is very important. Duplicating tests, for example, I now know if I have asked for labwork for you and if the doctor at Vall d’Hebron has ordered it, I might not have to ask for it, because I already have it, so we save time and money, both things.”

(INTERVENTION 44) [On the main advantages of applying ICTs to health] “It allows us to be much more efficient in care, it allows you to optimize times, it allows you to optimize processes, it allows you, for example, [the cost of] simply moving paper associated with a physical clinical file, the paper kind, it’s impressive, managing files, external files, sometimes even external contracts to move papers, all this kind of stuff disappears and well this is a very small part but a lot of savings come with implementing ICTs. In the area of digital imaging, for example, before, we had to print all the

	<p>x-rays, store them, manage all the filing and nobody ever dared destroy an x-ray even if it was 20 years old and then all that kind of stuff had tremendous costs associated with it and that is only a small part, and another advantage also, well I'm convinced of it as you see."</p>
<p>Effectiveness</p>	<p>(INTERVENTION 9) "You don't repeat tests unnecessarily and don't bother or harm the patient, it provides higher quality."</p> <p>(INTERVENTION 10) "Improves diagnoses by having more information."</p> <p>(INTERVENTION 11) "With the electronic prescription, medication and drug interactions can be controlled."</p> <p>(INTERVENTION 12) "The work of uploading and downloading files, the filing of these files, the fact that doctors or their assistants had to hand record the notes in the Clinical Records, etc. All this has been eliminated with the new technologies, we have become more efficient, faster and therefore save a lot of money".</p> <p>(INTERVENTION 13)[As practitioners they] "know that [others] can read their DMR, people are very careful about</p>

what they write, because we all have feelings and you say ‘Watch out! Look what you wrote about this patient, you did not guess that.’ Then, man, people worry, and you think twice about what you write and that reduces errors.”

INTERVENTION 31) [On the main advantages of applying ICTs to health] “Efficacy and efficiency. In other words: diminishing costs but also improved quality. It facilitates what we call integration of information which thus facilitates transversality in clinical processes: in other words that in a transparent way, the citizen can visit primary care and be sent for additional tests as an outpatient, in a hospital, or transferred to another facility and all this is transparent and gathered by a well-integrated information system that evidently offers greater safety for the patient. We know that we can watch out for the patient at the level of drug interactions, greater quality for the patient because we do not repeat tests, it is valuable to the entire clinical process to know what has been done and what the results are and why and therefore how to improve future applications of processes, well ... from aspects of efficiency that we have already talked about, of help to support decision-making, improve management, improve quality and patient safety.”

<p>Problems detected</p>	<p>(INTERVENTION 14) “The system sometimes crashes and there is nothing worse than a [blank] screen [when you’re] looking at someone and someone beside you says ‘I see how this is going, right?’ And you send it to the printer and it is not working because after a while it disconnects and the professional is left waiting there with the patient in front of them.”</p> <p>(INTERVENTION 15) “Yes, well with telemedicine we are making a digital divide between some patients and others.”</p> <p>(INTERVENTION 25) “It isn’t just about the lack of knowledge but also the habit, being accustomed to managing an application completely with all the technological know-how you can have, the fact that changing this application could in theory be complicated because it alters the daily rhythms of the professional and well from here we try, well when this change occurs, when you have to change or centralize an application or some service, to offer it in the least problematic way, the least traumatic way possible and there I insist a lot on training so that they provide it from the beginning.”</p>

(INTERVENTION 26): “Yes, yes this change is undoubtedly one of the barriers to the development of technologies. And as a barrier to development well I highlight the infrastructure, the infrastructure in the end can also be one of the barriers ... Technologies have an outrageous pace of improvement and services, and sometimes adapting the hardware to the software can also be a barrier to the development of ICTs. And as we have commented, the utility, the adaptation of technological changes well they tend to be accompanied by [improvement in] the quality of the services offered to avoid rejection by the end users. Knowledge, what we have been talking about, both the quality of the information made available and the knowledge of the user are technological barriers, I would also add there.”

(INTERVENTION 28): “Yes, the only thing that could be a barrier but I see we’re steadily achieving is the topic of interoperability, but more and more I see it is one of the barriers that for some time, some years ago could have been one of the most important barriers to development, high on the list, but it’s true that I am also seeing that we’re achieving more and more interoperability, the health programs they offer are already prepared for easy interoperability and

	<p>access, for example, our <i>Jara</i>, I believe we've mostly achieved it.”</p> <p>(INTERVENTION 39) “What other barriers? Well at present the economic one is also very high on the list, in the end to implement these kinds of systems you normally have to make an important initial investment though in the long run it's demonstrated that there's a return on the investment, isn't there?”</p>
<p>Potentialities for management</p>	<p>(INTERVENTION 16) “It seems odd for a patient to see a doctor who does not look at the screen. They wonder what happened, do they have a problem?”</p> <p>(INTERVENTION 17) “For me, the great potential is the level of information we have now, the level and the quality of the data we have.”</p> <p>(INTERVENTION 18) “And I think there are three very clear areas. The first is the medical professional, because he works with a lot more information, with integrated information and therefore [works] more securely. The patient, can access – now, you can access your own information – but there is also a part that seems very important to me and it is the</p>

information for the managers, that is, the people who are dedicated to management; for us, it is essential to have quality data for making appropriate decisions, that we did not have that information before or that it cost us a lot of work ... it is a little [like] collective intellect.”

(INTERVENTION 19) “The ultimate goal is that you can combine information from different healthcare areas to obtain demographic characteristics or to obtain a care profile and also be able to assess a specific health problem, where, in which population group or in what geographical area it is affecting.”

(INTERVENTION 20) “ICTs must allow us to try to geo-reference the user database, so that at any given time, you can have any health problem geo-referenced, you can locate areas with a greater concentration of a disease or a certain problem. This allows you to calculate assistance needs and has impressive potential.”

(INTERVENTION 21) “But we want to go a little further; we do not just want patients to know their data, but we want the patients to communicate with the health person they trust, your nurse, your doctor, so that there are ways the patient can

	<p>avoid having to go to their clinic, but they can make their query via computer with non-contact care and avoid going first to the primary care team and, second, to avoid wasting time on travel, money, work, to solve a problem that is probably very banal in some cases.”</p> <p>(INTERVENTION 22) “We must empower and empower, what they say now, make citizens themselves active agents with respect to their data protection. Then the healthcare professional is the one who access and manages that information, they will think twice before engaging in some practices that are illegal, then they would handle their data or those of their family carefully.”</p> <p>(INTERVENTION 23) “There is another area of work that has to do with telemedicine, telecare and patient empowerment. Increasingly patients want to stop being patients to start being agents. An active element in their health, they want to know, they want to know, they want to be able to participate in their decisions ... they have to be given tools and ICTs can be the solution.”</p> <p>(INTERVENTION 24) “IT can help the user shift from being a patient to being an agent of his/her health.”</p>
--	--

(INTERVENTION 29) [Regarding interoperability] “Yes, the ministry (...) generally leads it and coordinates with the other Communities, in fact now the shared digital clinical file has been launched and now we also [have it?] they are working a lot at the ministerial level with the health ID card to develop a common health ID card for all the communities, throughout Europe (...) in the end everything will end up in also being able to prescribe a common prescription and they are working a lot now on coordinating all this also these are complicated times on the subject of having to save on public spending and having to work with other communities and work out agreements with them and I think it’s great.”

(INTERVENTION 34) “I think all this is a challenge, because to convince the professionals I don’t think it will be difficult because it’s obvious, the topic of including citizens in the use of technologies, not only to facilitate access to results or schedule visits, but becoming co-responsible for their health, that is a greater challenge, I would say, because as we have seen, it involves a cultural change, but it is the objective we should have. Because all the rest, with help from tech companies, which have a very significant presence in our territory also, I believe that the tech companies

	<p>themselves will also facilitate the use of technologies in our institutions and such because they make it easier all the time, they give us easier, more interoperative solutions at much more efficient prices than before. Our true challenge will also be to transform citizens into users of ICTs for their health;”</p>
--	---