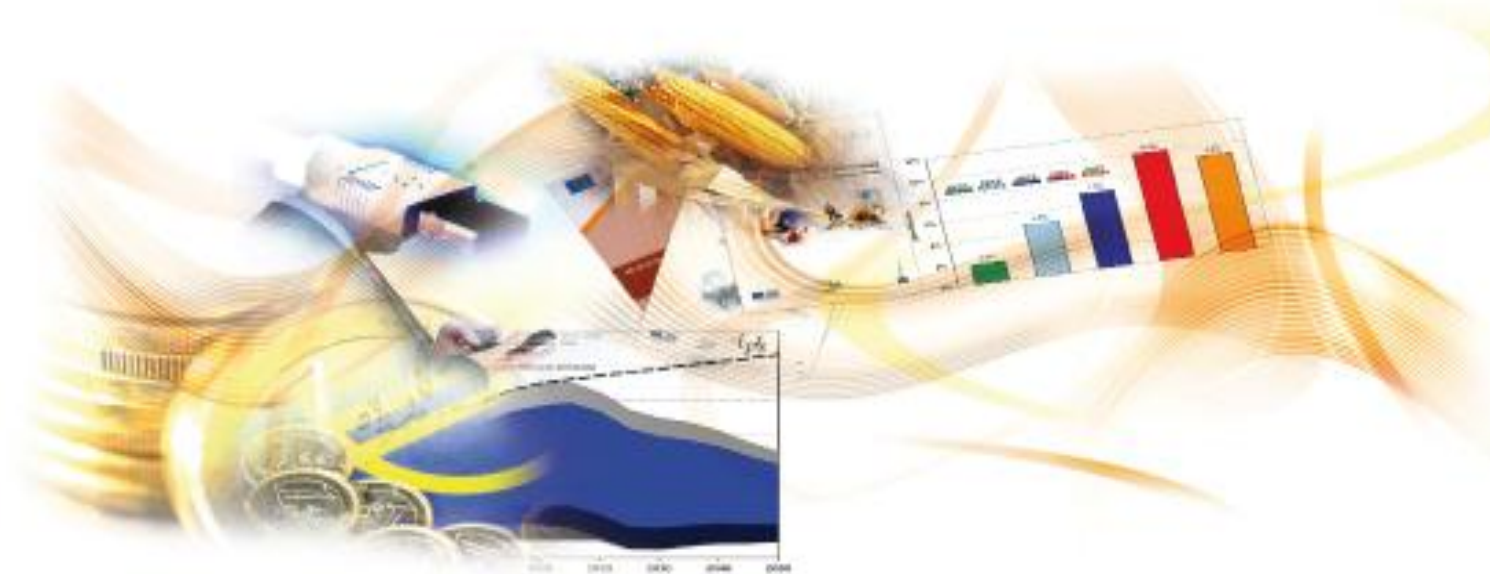# JRC SCIENTIFIC AND POLICY REPORTS

European Hospital Survey: Benchmarking Deployment of eHealth Services (2012-2013)

FINAL REPORT

Authored by PwC on behalf of JRC-IPTS

2014

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Preface

The "European Hospital Survey: Benchmarking deployment of e-Health services (2012–2013)" project gathered information on eHealth adoption and use in acute hospitals in all 28 EU Member States as well as Iceland and Norway (EU28+2). It was carried out on behalf of IPTS by Price Waterhouse Cooper (PwC) Luxembourg in cooperation with Global Data Collection Company (CDCC) which collected the data through a survey. This report prepared by PwC describes and analyses the main descriptive results of the 2012–2013 survey, which is the continuation of the eHealth benchmarking Phase III project carried out in 2010-2011 on behalf of the European Commission.

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1   Executive Summary

01   The objective of this survey, conducted by PwC Luxembourg in cooperation with GDCC, was to benchmark the level of eHealth use in acute hospitals in all 27 EU Member States and Croatia, Iceland and Norway. The total geographical scope is hereafter referred to as EU27+3. This study builds upon previous studies in the area, most recently the eHealth Benchmarking III study of 2011[1], hereafter referred to as "the previous study".

02   The survey targeted the Chief Information Officers (CIOs) of the acute hospitals. We used Computer-Aided Telephone Interviewing (CATI) with native-speaking interviewers. In total, we called 26,550 healthcare establishments within EU27+3. Of the 26,550 establishments, 5,424 qualified as acute care hospitals and of this number, 1,753 hospitals completed the interview.

03   We analysed the results by hospital size (i.e. number of beds, categorised) and by ownership type (public, private not for profit, private). At a national level, we analysed a number of eHealth take-up indicators and for certain countries, performed an analysis at regional level based on the NUTS[2] classification.

1.1   Main results from this study

eHealth uptake increases slightly

04   Overall, eHealth uptake in the EU27+3 countries has increased only slightly since the previous study. Notable growth areas are PACS and wireless infrastructures. PACS usage in hospitals has increased from 61% in the previous study to 70% today. Wireless infrastructure usage has similarly grown from 54% in the previous study to 66% in this study.

05   Areas which have not shown considerable progress are: EMR/EHR/EPR[3] usage, health information exchange and patient online access. More than 80% of the surveyed hospitals use an EMR/EHR/EPR system, which represents no change over the previous study. In addition, 90% of the surveyed hospitals still do not allow patients to access their EPRs online (compared to 95% in the previous study). More than 50% of the surveyed hospitals exchange clinical care information as well as laboratory results, whereas 46% did not experience interoperability problems.

06   However, this slight growth trend is uneven and a number of European countries have failed to register any meaningful growth or have actually fallen behind in their eHealth scores. This might be explained by the larger sample size used in this study. In fact, sample size has almost doubled in relation to the previous study (from n=906 to n=1753), which may simply have led to more realistic results. However, the uneven growth may also be a temporary setback due to the effects of austerity across much of Europe.

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[1]   Deloitte & Ipsos (2011), 'eHealth Benchmarking III, SMART 2009/0022, Final Report', Deloitte & Ipsos, April 2011, Belgium.
[2]   The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system dividing up the economic territory of the EU according to an established common classification of territorial units. Its purpose is to facilitate the collection, transmission and publication of harmonised regional statistics in the European Union. The establishment of the classification system ensures the stability of regional statistics over time and defines the procedure for any future amendments.
[3]   EMR: Electronic Medical Records, EHR: Electronic Health Records, EPR: Electronic Patient Records.

Size and ownership type play a role

07   Larger hospitals and public hospitals have a clear advantage as regards the development, take-up and roll-out of eHealth capabilities. This is no surprise as such institutions have larger economies of scale and greater in-house expertise in terms of vital eHealth skill sets. Larger hospitals (as well as public hospitals) are also generally better-equipped than private establishments and small and medium sized hospitals with respect to the type of internet connection they use. Overall, these factors allow larger hospitals to become eHealth hubs which can not only develop and roll out eHealth practices and solutions more quickly, but also lead with respect to the quality of and reliance on eHealth capabilities.

Nordic countries are strongest

08   Nordic countries continue to be the overall leaders in eHealth across the EU27+3, with consistent leadership across a range of eHealth indicators. Conversely, the lesser performing regions are within Eastern and Southern Europe. This remains an unchanged aspect of the eHealth situation in Europe and one that has persisted for a period of time.

When eHealth is in place, it's used

09   Hospitals which have eHealth functionalities mostly use them routinely. This is important because, overall, it justifies the investment into eHealth. For example, telehealth is only implemented to a minor extent and is mostly available for holding consultations with other healthcare practitioners (31%). However, when telehealth capabilities are implemented, they are mostly used (on average usage rates were approximately 90% of the surveyed hospitals).

Governance can be improved

10   Despite having apparently high rates for data security, data privacy and access rules and regulations, the gap should be much smaller. While 85% of hospitals surveyed have clear rules for accessing patients' electronic medical data, and more than 90% of hospitals surveyed have regulations to guarantee the privacy and security of data, either at national (58%), regional (27%) or hospital level (66%), we would have expected results in excess of this, considering that these should be mandatory areas. Also, only a small majority (57%) of European hospitals have an IT strategic plan, which does not bode well for efficient implementation of eHealth capabilities.

Sophistication level, IT budgets and interoperability issues are related

11   Hospitals situated in Nordic countries, larger hospitals and public hospitals are the categories of hospitals most likely to encounter interoperability problems and there is a relationship between sophistication, IT budgets and interoperability problems. Nordic countries exemplify this. Despite being the most advanced in terms of implementation of computerised systems or applications, and also devoting a generally higher part of their budget to IT than other countries, they also have the greatest level of interoperability problems.

1.2   Policy recommendations

Benefit from the advantages of larger hospitals

12   As the statistics have demonstrated, larger hospitals have clear advantages in their use and deployment of eHealth capabilities. They are more likely to introduce and make use of eHealth capabilities, as well as exchange data electronically, regardless of the data involved. In the previous eHealth benchmarking study the authors noted in their conclusion to put forward the concept of building relationships between small and non-university hospitals with large, research-oriented or university hospitals.

13   We concur with this idea, but suggest examining how this can be leveraged on in a more practical way, particularly with respect to eHealth infrastructure and assets. For example, we believe it may be worth investigating the possibility of assigning national 'centre of excellence' status to larger hospitals with

advanced eHealth capabilities and assign incentives for these hospitals to improve upon and develop eHealth further – particularly when these eHealth capabilities can be extended to other hospitals.

Accelerate efforts to overcome interoperability issues

14   The concepts of interoperability and electronically exchangeable patient data are not new. They were noted already in the 2004 Action Plan[4], the 2006 Report of the Unit ICT for Health in collaboration with the i2010 sub-group on eHealth[5] and the 2008 Recommendation on interoperability[6] amongst others. Interoperability was also raised in the 2010 benchmarking study[7] as an ongoing issue, and cited again in the 2011 Cross-border Healthcare directive[8], which stated that 'widely different and incompatible formats and standards are used for provision of healthcare using ICTs throughout the Union, creating both obstacles to this mode of cross-border healthcare provision and possible risks to health protection'. Interoperability remains a clear issue of concern based on our observations within this study.

15   Deliverables from various EU efforts (epSOS[9], CALLIOPE[10] and HITCH[11]) should be evident from 2014 onwards, and will hopefully be reflected in the corresponding benchmark study for that period. However, based on the long duration of interoperability issues with the eHealth sector, it may be time for the EU to consider bolder action in relation to interoperability issues if no substantive progress is evident by that time.

Close the governance gaps in data security, privacy, access and hospital ICT strategy planning

16   The Commission is currently working on a root and branch review of the EU's data protection rules, and therefore has a golden opportunity to create a regime which will be conducive to eHealth capability development. Therefore, it is to be hoped that the ultimate output of this review will address the high-level concerns in relation to data exchange, privacy and access. These parallel trends should produce a functioning regulatory and technical environment which is conducive to a much greater development and roll-out of eHealth capabilities.

17   However, at the hospital level there must be a concentrated push to close all current gaps in security, guaranteeing the privacy and security of data and accessing patients' electronic medical data. By contrast to infrastructure and ICT investment, this is a relatively low cost area which can be addressed by Member States (with whom the responsibility lies to implement the provisions of the Cross-border healthcare directive for example) simply by enforcing the requirements of the Directive.

18   Similarly, the current low levels of strategy planning need to be improved, and all hospitals should either have an ICT strategy plan of their own, or at least be incorporated under regional and/or national ICT strategy plans if the hospital is below a certain threshold in terms of IT staffing, budgets, etc.

19   Promotion of specific Healthcare ICT governance, covering eHealth as a major component, derived from existing best practices in both the healthcare sector and the ICT industry, could assist in the improvement of this area and closure of the governance gap.

1.3   Methodology recommendations

20   By default, we have carried out the survey via Computer-Aided Telephone Interviewing (CATI) targeting the Chief Information Officers (CIOs) with native-speaking interviewers. Interviews were conducted in one of

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4   European Commission, COM (2004) 356, 'e-Health - making healthcare better for European citizens: An action plan for a European e-Health Area', European Commission.
5   European Commission (2006), ICT and e-Business in Hospital Activities: ICT adoption and e-Business activities in 2006', Sector Report No. 10/2006, European Commission.
6   European Commission, COM(2008)3282, 'Commission Recommendation of 2 July 2008 on cross-border interoperability of electronic health record systems', European Commission.
7   Deloitte & Ipsos (2011), op. Cit.
8   European Commission, 'Directive 2011/24/EU of the European Parliament and of The Council of 9 March 2011 on the application of patients' rights in cross-border healthcare', European Commission.
9   The European Patients Smart Open Services project, http://www.epsos.eu/, accessed 16 May 2013.
10   A thematic network on eHealth interoperability, http://www.calliope-network.eu/, accessed 16 May 2013.
11   Healthcare Interoperability Testing and Conformance Harmonisation, http://www.hitch-project.eu/, accessed 16 May 2013.

the official languages of the country. While CATI was the predominant method, responses could also be provided via an online questionnaire in order to improve response rates. The questionnaires were translated into 23 languages covering EU27+3.

21   Our validation of the sources of the previous study[12] demonstrated that the earlier estimated universe of 12,230 acute hospitals in that study was larger than current official records would support. Due to this reason, a census strategy was proposed as the best approach for estimating the universe and collecting the data.

22   To initiate an interview, the interviewers requested to speak to the CIOs of those hospitals defined as acute and invited them to participate in the survey. Depending on the CIO's availability, the interviewer then either started the interview immediately or booked a future date to conduct the survey. Each interview lasted on average 43 minutes. The main field work started shortly after the pilot phase in October 2012 and lasted until early February 2013.

For future benchmarking studies

- Shorten the overall questionnaire to a more manageable length in order to increase the number and quality of responses.
- Generate new indicators from the new block of questions (Block F: IT functionalities) which can complement the 13 indicators already in use for benchmarking.
- Consider exploring the barriers to the development and usage of eHealth capabilities. The current survey mainly gathers information on the access and penetration of eHealth capabilities but not the impediments to developing eHealth more widely.

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[12]   Deloitte & Ipsos (2011), op. Cit.

2 Introduction

2.1 Context of the study

2.1.1 Health, Healthcare and eHealth

23 The World Health Organisation's definition of health is: 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'[13]. As can be observed, this definition allows for an extremely broad range of areas to be considered within the ambit of health. Taking primary health care as an example, the WHO's ultimate goal of primary health care is better health for all. WHO has identified five key elements[14] to achieving that goal:

- Reducing exclusion and social disparities in health (universal coverage reforms);
- Organising health services around people's needs and expectations (service delivery reforms);
- Integrating health into all sectors (public policy reforms);
- Pursuing collaborative models of policy dialogue (leadership reforms); and
- Increasing stakeholder participation.

24 However, healthcare as a sector is facing increasingly high barriers in terms of accessibility, funding and efficiency. Health gaps between countries and among social groups within countries have widened. Social, demographic and epidemiological transformations fed by globalisation, urbanisation and ageing populations pose challenges of a magnitude that was not anticipated three decades ago[15]. Healthcare is hence globally impacted by a combination of powerful trends:

- The demographic shift towards an ageing population;
- A rise of chronic diseases and in disease burden;
- An increasing demand for quality healthcare services; and
- Difficulty to control expenditures and to assign incentives in a fair way.

25 These trends consequently lead to a risk of disruption of social cohesion and health sector resilience[16] as well as to continuously rising healthcare cost. If ignored, these trends will overwhelm health systems, creating massive financial burdens for countries, with repercussions on individuals[17]. This financial burden can already be seen in the high per capita healthcare spending in developed countries. It can be observed that there is still room for improvement regarding the elimination of waste and the promotion of efficiency. Several measures apply: more efficient procurement, more rational medicine use, properly allocated and managed human and technical resources, as well as defragmentation of financing and administration. Some countries obtain higher levels of coverage and better health outcomes for their money than others, and the gap between what countries achieve and what they could potentially achieve with the same resources is sometimes vast[18]. This clear need for greater efficiency, resource care, as well as greater flexibility required for the provision of healthcare is currently driving the development of 'eHealth'.

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[13] Preamble to the Constitution of the World Health Organisation as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organisation, no. 2, p. 100) and entered into force on 7 April 1948.

[14] WHO: http://www.who.int/topics/primary_health_care/en

[15] WHO (2008), 'World Health Report 2008', the World Health Organisation.

[16] Ibidem.

[17] PwC (2010), 'Luxembourg Ministry of Health eHealth Service Platform Study, Final Report', PricewaterhouseCoopers.

[18] WHO (2010), 'World Health Report 2010', the World Health Organisation.

26   There is no single definition of what eHealth is. This term is now used to characterise not only 'Internet medicine', but also virtually everything related to computers and medicine. Today, the word eHealth stands at the crossroads of medical informatics, public health and business, and refers to health services and information delivered or enhanced through the Internet and related technologies.

27   The European Commission eHealth Action Plan defines eHealth as referring to "the application of information and communications technologies across the whole range of functions that affect the health sector"' and "including 'products, systems and services that go beyond simply Internet-based applications"[19]. Forms of eHealth include electronic health/medical records (EHR/EMR), telemedicine (including m-Health), consumer health informatics, health knowledge management, virtual healthcare teams, or Healthcare Information Systems (HIS).

28   eHealth increases and supports the quality of healthcare through better follow-up of patients, greater exchange of data and information between healthcare professionals, fewer prescription errors and more healthcare services for patients. This was demonstrated in a dedicated study of six European countries[20]. Among the main findings it is worth pointing out that, for instance, prescription errors could be reduced (for example 1 million per year in France and 300,000 in the Czech Republic), adverse drug events leading to 100,000 in-patients (requiring 700,000 extra bed-days and €300 million of treatment cost per year, across six countries) could be avoided as well as 5.6 million unnecessary admissions to hospitals for chronically ill patients (across six countries). eHealth also improves the efficiency of care and decreases healthcare costs by eliminating duplicate and unnecessary diagnostics or therapeutic interventions.

29   However, implementation costs are deemed to be high. An average of 4 to 7 years are necessary for annual benefits to exceed annual costs and an average of 5 to 9 years are necessary for cumulative benefits to exceed cumulative costs[21,22].

30   A variety of stakeholders are involved in eHealth. Healthcare professionals are direct users of eHealth services, while local, regional and national governments are responsible for implementing and monitoring eHealth programmes and initiatives. Beyond the national scope, European-level policymakers take part in the drafting of regulations and recommendations. Over the last two decades, the European institutions have contributed substantially to the emergence and implementation of eHealth in European countries.

2.1.2   The context of eHealth in the world

31   The evidence base for the benefits of eHealth has been further established by other intergovernmental organisations. In 1998, the World Health Organisation (WHO) recognised the importance of regulating cross-border advertising and the promotion of medical products through the internet[23]. At the 58th World Health Assembly in Geneva, Switzerland, WHO adopted a resolution on eHealth[24]. The resolution invited WHO Member States to conceive and implement health information systems, to evaluate eHealth activities and to share knowledge on cost-effectiveness, thus ensuring quality, safety, ethical standards, data confidentiality, privacy, equity and equality.

32   In the same year, WHO launched the Global Observatory for eHealth (GOe) aiming at monitoring the development of eHealth in 114 WHO Member States. WHO released the second Global Survey results on eHealth in 2010 and 2011[25]. The survey covers a broad variety of topics such as the national policy framework (eGovernment, eHealth, ICT procurement, multiculturalism, telemedicine), the legal and ethical framework or eHealth application initiatives (telemedicine, m-health and e-Learning) implemented at national level. The report also highlights the Member States' barriers in

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[19]   Global Observatory for e-Health: http://www.who.int/kms/initiatives/ehealth/en/, accessed 29 March 2013
[20]   Gartner (2009), 'eHealth for a Healthier Europe!', Gartner.
[21]   European Commission (2010), 'Socio-economic impact of interoperable electronic health record and ePrescription systems in Europe', European Commission.
[22]   EHR-Impact (2010), 'Interoperable eHealth is Worth it – Securing benefits from Electronic Health Records and ePrescribing', European Commission publication.
[23]   WHO (1998), 'Resolution EB101.R3 on Cross-border Advertising, Promotion and Sale of Medical Products through the Internet', the World Health Organisation.
[24]   WHO (2005), 'WHO Resolution WHA58.28 on eHealth', the World Health Organisation.
[25]   WHO (2010), 'Atlas of eHealth country profiles based on the findings of the second global survey on eHealth', Global Observatory for eHealth Series Volume 1, the World Health Organisation.

implementing these eHealth applications and the information needed to support telemedicine implementation.

33   In 2010, the OECD published a report on the improvement of Health Sector efficiency[26] analysing incentives, policy options, and institutional mechanisms tailored to the improvement of eHealth implementation. Based on case studies in six OECD countries (Australia, Canada, the Netherlands, Spain, Sweden and the United States), the report compares how these countries have implemented eHealth in order to illustrate the benefits and the drawbacks of eHealth in terms of quality and efficiency of care as well as operative and administrative costs.

34   Based on this report, the OECD launched a project[27] on "benchmarking ICTs in health systems" in order to harmonise statistical data at a worldwide level. An expert group has been established gathering representatives of 30 countries (including Brazil, Egypt and India) together with the European Commission, WHO and the OECD Business and Industry Advisory Committee. Its first workshop was held in January 2012 to identify priorities and ascertain the next steps to be taken, such as the creation of core indicators to be tested in pilot countries.

35   In order to foster eHealth cooperation between the European Union and the United States, a memorandum of understanding was signed during the Trans-Atlantic Economic Council (TEC) in December 2010 between European Commissioner Neelie Kroes and United States Secretary of Health and Human Services Kathleen Sebelius. The memorandum of understanding recognises the importance of health-related information and communication technologies (eHealth/ health IT) in promoting individual and community health while fostering innovation and economic growth and proposes the organisation of shared delegations, joint working groups, expert visits, conferences, meetings and workshops on standardisation, safety and education. In November 2011, the TEC reinforced the commitment on the Memorandum of Understanding and requested a report on the status of interoperability of Electronic Health Records (EHRs). Several workshops have been organised to establish a conceptual framework for the development of global interoperability standards and of a skilled IT workforce supporting healthcare professionals to use eHealth.

36   With regard to developing countries, several organisations support eHealth projects. For instance, the World Bank is funding 55 eHealth projects for about $1.5 billion[28]. Moreover, participants to the HIMSS G7, a World Bank-endorsed thought leadership assembly, established a wish list which included[29]:

- Collaboration around health IT initiatives in various regions around the world;
- Collaboration between the healthcare sector and the World Bank Group to support access to finance by small and medium local enterprises, and others;
- Reinforce research around business findings in client countries using World Bank-funded research in health IT;
- Collaboration between the health IT sector and the World Bank Group in making the regulatory environment less tedious, more predictable, stable and in alignment with regional and global markets;
- Collaboration between the health IT sector and the World Bank Group in capacity-building;
- Support health insurance as an important means through which countries can increase their access and utilisation of technology;
- Promote regional and international regulatory harmonisation.

2.1.3   The context of eHealth in Europe

37   Over the past two decades, enormous progress has been made in information and communication technologies (ICT) to support health systems and services in Europe. The European Commission has been at the forefront of policy-making and has supported Member States in developing their eHealth strategies. This has taken place in the context of broader initiatives in the ICT area and of more focused support for specific eHealth policies.

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[26]   OECD (2010), 'Improving Health Sector Efficiency: The role of Information and Communication Technologies', OECD Health Policy Studies.

[27]   OECD: http://www.oecd.org/health/health-systems/benchmarkingofinformationandcommunicationtechnologiesictsinhealthsystems.htm

[28]   HiMSS (2012), 'A HIMSS G7 Advisory Report. Advancing Global Health IT: A Consultation with the World Bank at HIMSS12', HiMSS.

[29]   HiMSS (2012), op. Cit.

38   Two Actions Plans, eEurope 2002 and eEurope 2005, have contributed to the development of eHealth across Europe. The eEurope 2002 Action Plan[30] was an integral part of the Lisbon strategy and established measures to make the European Union the world's most dynamic knowledge-based economy by 2010. Healthcare was already fully part of the Plan and was considered to be one of the key applications of Information and Communication Technologies (ICT). The Action Plan recommended ensuring that healthcare professionals had appropriate telematic infrastructures and established quality criteria for health-related websites, health technologies and data assessment networks. The subsequent eEurope 2005 Action Plan[31] followed the 2002 version but this time targeting more closely the development of services, applications and secure broadband Internet access. The modernisation of governmental and public services was one of the key focus points of this Action Plan. As for the healthcare sector, the Action Plan emphasised the substantial benefits of ICT applications in health management, including lower administrative costs as well as the provision of remote healthcare services, medical information and preventive services. More concretely, the Action Plan proposed the introduction of a pan-European health insurance card (firstly non-electronic) to replace paper forms, the establishment of health information networks between points of care, and the provision of online health services to the general public.

39   A specific eHealth strategy was proposed in 2004. The objectives of the 2004-2010 Action Plan for a European eHealth Area[32] were to achieve full potential in eHealth systems and services, in particular by addressing common challenges at the European level and by creating the right framework to support the development of eHealth. Practical examples included the piloting of eHealth actions and the sharing of best practices. This Action Plan was one of the first documents to propose concrete solutions for direct productivity gains based on the improvement of both quality of care and effectiveness. This also made Member States responsible for the deployment of eHealth in a practical fashion, including the development of a national or regional roadmap for eHealth covering (amongst other items) interoperability standards for health data messages, electronic health records and patient identification.

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[30]   European Commission, COM (2001) 140, 'Commission Communication of 13 March 2001 on eEurope2002: Impact and Priorities. A communication to the Spring European Council in Stockholm, 23-24 March 2001', European Commission.

[31]   European Commission, COM(2002)263, 'The eEurope2005 Action Plan: an Information Society for Everyone', European Commission.

[32]   European Commission, COM (2004) 356, op. Cit.

40   In addition to these programs, various Framework Programmes for Research and the Competitiveness and Innovation Programme Information and Communication Technologies Policy Support Programme (CIP ICT PSP) pilot actions have also supported eHealth initiatives. Structural Funds and regional funds have also been available since 2007 for the deployment of eHealth initiatives: however, apparently, it is considered that the Member States have to date not used these sources of funding to great advantage[33].

41   As from 2007, the practical issues within eHealth began to receive more attention. The objective of the European Commission's White Paper Together for Health[34] was to create a coherent framework for European health through guideline principles and implementation mechanisms for better cooperation between stakeholders at the EU level, including support for interoperable eHealth solutions. In addition, Communication COM(2007)860[35] highlighted low investments in the eHealth sector, a strong fragmentation of the market due to the different social security systems, a lack of interoperability and the need for a common legal framework within Europe. This was followed in 2008 by concrete recommendations regarding cross-border interoperability of electronic health records systems through the development and deployment of guidelines[36] for systems interoperability involving policy, social, and legal aspects. These recommendations also addressed the creation of processes and structures for pan-European interoperability and issues related to security, privacy and certification. At the same time, the EU-funded Thematic Network "CALLIOPE"[37], launched for 30 months, established a collaborative platform for many stakeholders in eHealth interoperability in Europe and enabled communication routes and working procedures.

42   Interoperability has remained a strong theme within EU policy. The 2009 ICT Standardisation Work Programme[38] highlighted the lack of interoperability and standardisation across systems, and three European Standards Organisations (CEN, CENELEC and ETSI) were invited to address existing standardisation gaps, especially regarding cross-border interoperability of electronic health record systems, the application of patients' rights in cross-border healthcare, telemedicine and market initiatives for eHealth themes. However, as outlined by the European Commission (Impact Study 2010)[39] on the benefits of Electronic Health Records and ePrescribing, the process of eHealth implementation remains slow. One of the reasons can be traced back to the fact that workflows and processes are significantly more complex in healthcare than in other economic sectors and are less easily standardised by conventional business systems. Another reason also suggested by the 2012 Impact Study[40] is the lack of awareness and sufficient empirical evidence on the costs and benefits of existing interoperable eHealth Record and ePrescription systems and services. Differences in the organisation and delivery of healthcare systems between various countries also constitute a major factor. Correspondingly the recently published eHealth Action Plan 2012-2020[41] — in line with the Europe 2020 Strategy[42] and the Digital Agenda[43] for Europe — addresses and proposes solutions to remaining interoperability barriers at the legal, organisational, semantic and technical levels.

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[33]   Deloitte & Ipsos (2011), op. Cit.
[34]   European Commission, COM (2007) 630, Together for Health: A Strategic Approach for the EU 2008-2013', European Commission.
[35]   Ibidem.
[36]   European Commission, COM (2008) 3282, op. Cit.
[37]   Calliope Network: "Creating a European coordination network for eHealth interoperability implementation", http://www.calliope-network.eu/
[38]   European Commission, DG Enterprise and Industry, ICT Standardisation Work Programme, http://ec.europa.eu/enterprise/sectors/ict/standards/work-programme/
[39]   EHR-Impact (2010), op. cit.
[40]   Ibidem.
[41]   European Commission, COM(2012) 736, 'eHealth Action Plan 2012-2020 - Innovative Healthcare for the 21st Century', European Commission.
[42]   European Commission (2010), 'Europe 2020: A strategy for Smart, Sustainable and Inclusive Growth', European Commission.
[43]   European Commission, COM(2010) 245, 'A Digital Agenda for Europe', European Commission.

43   Despite the ongoing challenges from an ICT perspective, an important boost to eHealth was achieved through Article 14(2) of the 2011 European directive on the application of patients' rights in cross-border healthcare[44] which marked formal cooperation on eHealth between Member States. The instrument establishes an eHealth network in charge of supporting and facilitating cooperation and the exchange of information among Member States. National authorities are asked to work together on a voluntary basis, in order to achieve common positions on eHealth and to promote an interoperable and sustainable implementation of eHealth across Europe. Member States are obliged to set up National Contact Points (NCPs) to provide the appropriate information on all essential aspects of cross-border healthcare. This is to enable patients to exercise their rights on cross-border healthcare in practice.

44   Individual Member States are responsible to decide on the form and the number of NCPs needed in order to provide the proper information about cross-border healthcare. Such a function could for instance be incorporated in existing information centres[45].

2.1.4   The need for monitoring ICT take-up in the healthcare sector

45   Considering the complexity of the eHealth environment, as well as its strategic importance to sustainable healthcare, benchmarking is vital to establishing progress made, as well as identifying areas of concern and potential areas for future policy attention. Benchmarking of progress is therefore an important element of the Commission's contribution to the improvement of healthcare. This necessarily must take into account not just statistical measures, but also trends in the overall area of eHealth, a sector fundamentally affected by the rapid pace of information and communication technology and usage.

46   Previous studies have focussed on the specific implementation of eHealth across different health sectors. The first study focussed on the use of ICT by general practitioners[46], and showed that e-Health applications had a growing role in the doctors' practices, although there is room for improvement in areas such as e-Prescribing, telemedicine, and cross-border interoperability. The second study collected and analysed existing eHealth monitoring and benchmarking sources in Europe and beyond, identified good practices in data gathering and developed an indicator framework for an EU-wide quantitative benchmark[47] covering key eHealth stakeholders and eHealth related activities. The third study[48] focussed on hospitals as key institutions in the healthcare system and their role in the adoption of eHealth processes. That study developed composite indicators on the basis of the Deloitte-Ipsos survey results (see further below). Prior to this study, the eBusiness W@tch survey[49] of 2006, which surveyed 834 acute care hospitals in 18 countries, found that hospitals were in general better equipped with basic ICT infrastructure than other sectors. However, hospitals still showed weaknesses in the introduction of ICT applications directly with patients.

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[44]   European Parliament (1995), 'Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare', European Parliament.

[45]   PwC (2012), 'Recommendation Report: A Best Practice based approach to National Contact Points Website: Feasibility Study', PricewaterhouseCoopers.

[46]   Empirica (2008), 'Benchmarking ICT use among General Practitioners in Europe', European Commission publication, http://www.rcc.gov.pt/SiteCollectionDocuments/ICT_Europe_final_report08.pdf

[47]   European Commission (2009), 'eHealth Benchmarking (Phase II)', a study of Empirica for the European Commission, http://www.ehealth-benchmarking.eu/results/documents/eHealthBenchmarking_Final-Report_2009.pdf

[48]   Codagnone, C. & F. Lupiañez-Villanueva (2011), 'A composite index for the benchmarking of eHealth Deployment in European acute Hospitals. Distilling reality in manageable form for evidence based policy', Institute for Prospective Technological Studies (IPTS) - European Commission's Joint Research Centre (JRC).

[49]   European Commission (2006), op. Cit.

47   Cultural aspects should also be taken into account as Europe has a broad diversity of healthcare systems. Healthcare establishments can be public, private or private-not-for-profit, on one site or spread across several locations, specialised or general and can vary widely in scale. In addition to these factors, types of establishments and healthcare systems can also vary across Europe and hence can impact medical practices and usage of eHealth solutions. For example, depending on the health insurance system, patients with private health insurance may have their care services fully reimbursed, bypass waiting lists (e.g. UK), have access to services that are not covered by the public health system (e.g. Hungary), or have access to specialised physicians affiliated to private health insurance only (e.g. Germany)[50].

2.2   Objectives of the study

2.2.1   Overall objectives of the study

48   The overall objective of the European Hospital Survey (Benchmarking deployment of eHealth services, 2012–2013) is to contribute to public services improvement, particularly in the healthcare sector, by assessing the level of eHealth usage in acute care hospitals in the EU27, Norway, Iceland and Croatia.

49   This study is part of a broader research context. In particular, it will update the findings of a previous study carried out in 2010 by Deloitte/Ipsos ("eHealth Benchmarking Study III", hereafter "the previous study"). Hence, a significant portion of this report will focus on monitoring apparent trends and changes in the eHealth landscape.

2.2.2   Specific objectives

50   The specific objective of this study is to design, conduct and present a survey on the level of eHealth deployment with a representative sample of acute hospitals in the EU27, Norway, Iceland and Croatia.

51   Following the guidelines of the previous study and in direct collaboration with IPTS, the study will be structured in line with the following objectives:

52   Draw up, propose and agree on a definitive set of questions and a scientifically robust and transparent sampling and data gathering strategy to carry out the field-work, ensuring appropriate geographical distribution of the acute care hospitals.

53   Conduct a survey in collaboration with the Chief Information Officers (CIOs) working at the acute hospitals of the selected countries.

54   Analyse the survey data in order to present the descriptive statistics and the characterisation of the acute care hospitals surveyed.

55   Present a survey set up that will enable the monitoring of the evolution over time.

2.3   Content of the final report

56   The final report covers the following:

- Chapter 3 – Methodological approach: summary of the survey methodology and drafting of the questionnaire. A more detailed methodology is presented in Appendix 4: Details on the methodological approach;
- Chapter 4 – Overall results at European level: descriptive analysis of the survey results for EU27+3. Differences according to size and ownership of hospitals together with specificities of major countries are also presented;
- Chapter 5 – Results at country level: country reports comparing each country profile to the European average and to the previous study for 13 selected indicators, results of 5 selected indicators by size and by ownership. Regional specificities (NUTS 1/2 levels) are presented for selected regions;
- Chapter 6 – Conclusions and recommendations: comparison with similar surveys and recommendations.

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[50]   PwC (2012), op. Cit.

3 Methodological approach

57 This chapter presents the preparation and the implementation of the survey. A detailed description is given in Appendix 4: Details on the methodological approach.

58 The project consists of the following three main phases:

- **Phase I. Survey structure preparation and definition of sampling methodology:** the work plan, the draft questionnaire, the sampling methodology and approach. This also included translation of the questionnaire into the different country languages as well as the pilot phase of the survey;
- **Phase II. Survey implementation:** This phase included data gathering, data cleansing and the development of the codification manual;
- **Phase III. Survey analysis and reporting:** analysis of collected data and preparation of a final report presenting the results at European, national and in specific cases regional level.

3.1 Overview

59 The objective of this survey is to benchmark the level of eHealth use in acute hospitals in all 27 EU Member States and Croatia, Iceland and Norway. The total geographical scope is hereafter referred to as EU27+3.

60 By default, we have carried out the survey via Computer-Assisted Telephone Interviewing (CATI) targeting the Chief Information Officers (CIOs). Native-speaking interviewers have conducted the interviews in one of the official languages of the countries in scope. The predominant use of CATI ensures user-friendliness as the respondent can ask for explanations or clarifications directly, has direct human contact and hence avoids e-mails and reminders.

61 However, we also offered the interviewees the possibility to respond via an online questionnaire. This ultimately led to a greater response rate.

62 In the context of this survey, the universe is the population of acute care hospitals in all EU27+3 countries. Our review of the sources of the previous study[51] has shown that the earlier estimated universe of 12,230 acute hospitals in that study was larger than current official records would support. Based on the national Ministries of Health's official information sources, we reassessed the universe and obtained a number of 8,199 acute care hospitals.

63 This is why a census strategy was proposed as the best approach for estimating the universe and collecting the data. A census is one of the most viable methods to ensure that we reach every entity within the universe. The census is also the best way to implement a proportional sampling methodology that requires knowledge of the following elements: distribution of hospital size, ownership and region at NUTS[52] level.

64 A random sample of acute care hospitals, based on quotas for hospital ownership, hospital size and region (NUTS 2 level), was drawn from the universe. Target respondents have been selected through a random procedure.

65 The survey questionnaire was structured by subject blocks (cf. section 3.3 below) and built upon the previous[53] study as well as further sources. It was further developed in the kick-off meeting at IPTS in early September 2012 and finalised (English version) at the end of September 2012.

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[51] Deloitte & Ipsos (2011), op. Cit.
[52] NUTS are territorial units defined in terms of the existing administrative units in the Member States. An 'administrative unit' marks out a geographical area for which an administrative authority has power to take administrative or policy decisions in accordance with the legal and institutional framework of the Member State. NUTS 2 levels are administrative units comprising between 800,000 and 3 million inhabitants.
[53] Deloitte & Ipsos (2011), op. Cit.

66   To pilot the survey field work, the questionnaire was translated into 23 languages covering EU27+3. The translated questionnaires were quality reviewed by technically qualified native speakers and implemented into the CATI system.

67   To initiate an interview, the interviewers asked to speak to the CIOs of those hospitals defined as acute and invited them to participate to the survey. It was also suggested that a presentation letter from IPTS along with the questionnaire could be sent in advance (for the letter please refer to Appendix 5: Awareness letters).

68   Depending on the CIO's availability, the interviewer then either started the interview immediately or booked a future date to conduct the survey. Each interview lasted on average 43 minutes..

69   We conducted 122 interviews in the pilot phase (from 2 to 22 October 2012). The aim of the pilot phase was to detect wording issues and potential difficulties in understanding the questions. Suggestions regarding the optimisation of the questionnaire structure were also discussed with IPTS. Based on the feedback from the pilot phase, we updated the structure and implemented some minor changes to the questionnaire for the main field work.

70   The main field work started shortly after the pilot phase and lasted until early February 2013. In total, we called 26,550 healthcare establishments. Of the 26,550 establishments, 5,424 qualified as acute care hospitals and of this number, 1,753 hospitals granted us an interview.

3.2   Sampling methodology

71   The methodology used to define the appropriate sample in each of the 30 countries surveyed followed a four step approach:

3.2.1   Estimation of the overall universe

72   The previous eHealth Benchmarking III study was used as a basis to re-estimate the overall acute care hospital universe. The previous study used various sources to ascertain a total universe of 12,230 acute care hospitals. We verified these sources and found that many were no longer available or accessible, and commercial list brokers could not be considered reliable for the purposes of this study. For this reason, we also used the WHO list of hospitals for the 30 countries as well as hospital lists from the each national Ministry of Health. This led to a universe estimation of 8,199 acute care hospitals in the EU27+3 countries.

3.2.2   Implementation of a census strategy

73   To assure overall coherence of the data and analysis, we decided to apply a census strategy as the best approach for estimating the universe and collecting the data.

74   The census methodology is composed as follows:

- Define and select hospitals (not only acute) through commercial sources, official listings and business directories, such as Yellow pages and the PwC network;
- Remove duplicates from the data based on phone number and addresses to avoid calling the same entities more than once;
- Screen visually, whereby a native speaker goes through the whole list;
- Stratify on a country level.

75   Practically this meant that all entities contacted during the census were asked for ownership and size, and whether their institution was an acute hospital according to the agreed definition. Their postal code was also recorded so the region could be defined.

3.2.3 Determination of sampling approach by country

76   The following elements are part of the stratification of the sample and were determined from the actual answers to the questionnaire:

- Location: Country / NUTS 1/ NUTS 2 level classification, using the postal code;
- Ownership: Public, private, private not for profit;
- Size class: Number of beds (< 101 beds, 101-250 beds, 251 to 750 beds, > 750 beds);
- Acute hospital: Definition implemented in screening questions.

Definition of "Acute hospital":

As the definition of acute care hospital varies across the different EU countries, we defined the following criteria to qualify survey participants as acute care hospital:

1. Respondents consider that the hospital is an acute or general hospital; or
2. The hospital has an emergency department, and *at least one* of the following:
    a. a routine and/or life-saving surgery operating room; and/or
    b. an intensive care unit.

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77   All other types of health care establishments were excluded. Therefore, psychiatric hospitals, military hospitals, police hospitals, prison hospitals, non-hospital primary care centres, family planning centres, facilities focusing on plastic surgery, hospices, mobile emergency care providers, fertility clinics and diagnostic imaging clinics are not part of our study.

78   No exclusion criteria have been applied with regard to ownership (public, private, private not-for-profit), size (number of beds), teaching activity (university hospital, non-university teaching hospital, non-university non-teaching), or organisation of the hospital (independent on one site, independent on multiple sites, part of a group, etc.).

79   The unit of enquiry has been defined as the actual "acute care hospital" (i.e. the local unit where healthcare was provided). In the case of grouping of hospitals, information was collected only for the acute care unit sample.

3.2.4 Calculation of error margins and confidence intervals

80   For the countries, an initial sample figure was calculated as well as the related error margins.

81   These error margins represent a measure of the variability of estimates due to sampling error and so enable data users to measure the range of uncertainty around each estimate. Two error margins were calculated for each country, based on answer characteristics of 30% and 50% (corresponding to different assumed levels of accuracy or, in other words, sampling errors).

82   We have calculated the error margins at country and regional level, based on a confidence interval of 95%. The confidence interval corresponds to the range of values of sample observations that contain the true parameter (here, the sample figure) value within a given probability of 95%.

83   Error margins and confidence levels for the sampling have been recalculated based on the final size of the universe from the census results.

3.3   The questionnaire

84   The main sources which influenced the design of the questionnaire were:

- "eHealth Benchmarking Study III"[54]: This study contributed to the development of a definitive set of questions and a scientifically robust and transparent sampling and data gathering strategy for the field-work. This ensured appropriate geographical distribution of the acute care hospitals;
- "A Composite Index for the Benchmarking of eHealth Deployment in European Acute Hospitals"[55]: based on the Deloitte/IPSOS study, this study constructed a composite index, offered key policy messages and new areas for research;
- "Benchmarking ICT use among General Practitioners in Europe"[56] contributed a number of questions, particularly those related to the availability and usage of eHealth applications and data exchange; and
- "The eHealth Service Platform Study", a PwC benchmarking study on 20 international, national and regional eHealth platforms[57].

85   Three new sections were added into the original questionnaire included in the latest version from IPTS. These were pilot-tested with CIOs from 6 countries (ES, IT, DE, UK, HU, LU). A validation workshop has been held with EC experts.

86   Translations were initiated in late September 2012, with the questionnaire translated from Standard English into 23 different languages by an accredited translation agency with experience in translating questionnaires and health-related terminology. Multiple cross-checks ensured the quality of the translations, with translations double-checked by evaluators from our subcontractor GDCC and by PwC native speakers, with further tests during the pilot phase.

87   The questionnaire has been organised as follows:

- Screening questions (acute care hospital definition, size, ownership, etc. see above);
- The main part of the survey, divided into 7 blocks:
- Block A. Characterisation of the hospital;
- Block B. ICT infrastructure;
- Block C. ICT applications;
- Block D. Health Information Exchange;
- Block E. Security and privacy;
- Block F. IT functionalities;
- Block G. Hospital statistics.

88   The final version of the questionnaire is presented in Appendix 3: Final questionnaire.

89   For further details on the methodological approach, please refer to Appendix 4: Details on the methodological approach.

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[54]   Deloitte & Ipsos (2011), op. Cit.
[55]   Codagnone , C. & Lupiañez-Villanueva, F. (2011), op. cit.
[56]   Empirica (2008), 'Benchmarking ICT use among General Practitioners in Europe', European Commission Publication.
[57]   http://www.sante.public.lu/fr/systeme-sante/programme-esante/agence-esante/pwc-report-ehealth-service.pdf

4   Results at European level

4.1   Overview

90   This chapters describes CIOs' answers to the "European Hospital Survey: Benchmarking deployment of eHealth services (2012-2013)" questionnaire at European level. Comparisons at national level have also been highlighted when major differences were observed. Lower results were observed for some questions when compared with the 2010 questionnaire. This could be due to the different samples and/or methodologies used in the two studies. Further details can be found in Chapter 5, which provides an analysis at national and regional level.

91   The completed interviews for this survey add up to 1,717 units. However, due to the specificities of the UK system, the answers for UK NHS Trusts have been duplicated to include the underlying acute care hospitals and to enhance sample representativeness. This increased the final sample to 1,753 hospitals. The table below gives the number of completed interviews achieved in each country.

Table 1: Interviews completed by country

Country	Universe	Acute care hospitals	Sample achieved 2012
EU27+3	**26,550**	**5,424**	**1,717**[58]
EU27	**26,361**	**5,364**	**1,691**
Austria	242	132	43
Belgium	436	120	50
Bulgaria	388	109	62
Croatia	75	22	11
Cyprus	70	22	13
Czech republic	470	142	40
Denmark	270	54	16
Estonia	136	25	12
Finland	620	46	26
France	7,649	997	319
Germany	3,847	1,295	201
Greece	687	120	68
Hungary	492	102	43
Iceland	14	10	9
Ireland	492	42	23
Italy	2,517	497	196
Latvia	138	32	19
Lithuania	219	63	32
Luxembourg	7	7	3
Malta	10	3	2
Netherlands	606	114	26
Norway	100	28	6
Poland	2,411	459	149
Portugal	589	73	41

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[58]   This base does not include the 36 duplicated records of the acute care hospitals belonging to NHS Trusts of the UK. If we include them, the total sample is 1,753 hospitals.

Country	Universe	Acute care hospitals	Sample achieved 2012
Romania	1,042	166	85
Slovakia	391	72	33
Slovenia	186	14	6
Spain	1,311	478	124
Sweden	246	78	26
United Kingdom	889	102	33

92   When analysing the data at Country level as well as by hospital size and ownership type, only valid answers have been taken into account (i.e. excluding "don't know" answers). This is the reason why samples, and in some cases, results, might differ slightly between various types of analysis.

4.1.1   The European eHealth capabilities

93   In order to profile eHealth capabilities at the country and European level, 13 indicators, selected in the previous study, have been analysed and compared with the 2010 results. These indicators are illustrated through spider diagrams. A more detailed approach on the eHealth indicators can be found in section 5.1.2.

94   When analysing Europe's eHealth capabilities it is noticeable that these have grown overall, but despite this there has been some contraction at both country level and indicator level. Overall growth in eHealth capabilities has therefore been relatively small. The top five indicators that suffered a contraction were "Externally connected", "Broadband > 50Mbps", "Single EPR shared by all departments", "Clear and structured rules on access to clinical data" and "EAS for disaster recovery in less than 24 hours", with a negative growth of -2% to -8%. The other indicators registered positive growth, ranging from 2% to 17%.

95   Growth in eHealth capabilities is not evenly distributed. As the country reports will display, some countries have seen significant negative impacts on their eHealth capabilities (see Chapter 5). This is compounded by the fact that certain of these countries are already lagging behind. Therefore, should a trend emerge reflecting such patterns (where the weakest countries become weaker), it may require more forceful intervention and funding to close the gap to an acceptable level. Such a trend however can only be confirmed by the results of the next benchmarking study.

Figure 1: European indicator benchmarking results, 2010/2012
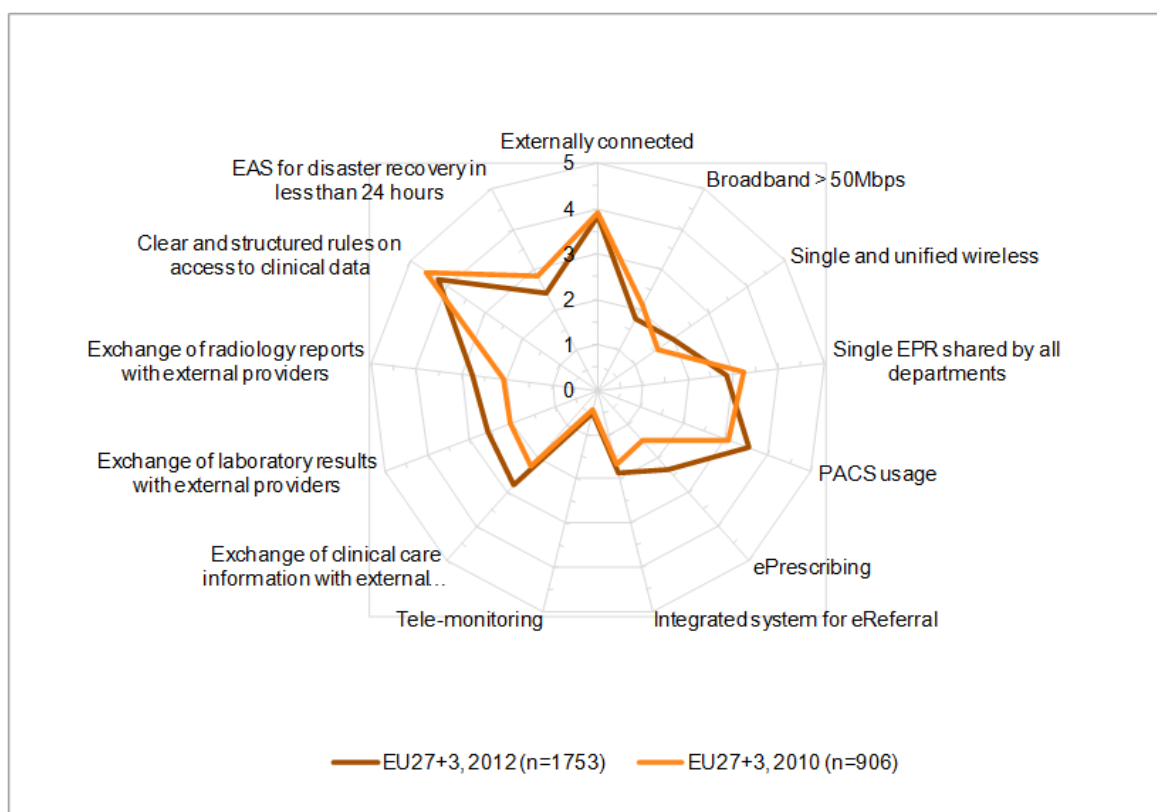
96   For some questions, an analysis by ownership type (public, private, private not for profit) and by hospital size categories (fewer than 101 beds, between 101 and 250 beds, between 251 and 750 beds, more than 750 beds) has been performed. The breakdown of the country samples by hospital size and ownership type are reported in the tables below, at both EU27+3 and EU27 level.

Table 2: Breakdown of the sample by ownership type of hospitals

EU27+3	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	5424	3168	1115	636	505
		58%	21%	12%	9%
2012	1753	1208	340	168	37
		69%	19%	10%	2%
2010	906	619	133	141	13
		68%	15%	16%	1%

EU27	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	5364	3118	1111	635	500
		58%	21%	12%	9%
2012	1727	1185	337	168	37
		69%	20%	10%	2%
2010	892	606	133	140	13
		68%	15%	16%	1%

Table 3: Breakdown of the sample by size of hospitals

EU27+3	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	5424	963	1443	1673	565	780
		18%	27%	31%	10%	14%
2012	1753	374	502	550	167	160
		21%	29%	31%	10%	9%
2010	906	207	291	291	97	20
		23%	32%	32%	11%	2%

EU27	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	5364	944	1432	1659	556	773
		18%	27%	31%	10%	14%
2012	1727	365	497	542	164	159
		21%	29%	31%	9%	9%
2010	892	204	286	286	96	20
		23%	32%	32%	11%	2%

97   The following figures contain an overview of the results by ownership type and by hospital size at EU27+3 levels.

98   Taking ownership type into account we observe that "*Clinical data access rules*" and "*PACS usage*" scored high overall in Europe regardless of ownership type. The maximum percentage difference between types of ownership was 3 percentage points for "*PACS usage*" and 11 percentage points for "*Clinical data access rules*", where Private not for profit hospitals recorded the highest score of all the series (92%). "*Single EPR shared by all departments*" and "*Exchange of CCI[59] with ext. Providers*" registered an implementation rate of about 50% regardless of ownership type. "*Broadband>50Mbps*" was remarkably the least implemented indicator, with an average implementation of 32% and a relatively good implementation by public hospitals (35%). There is a general tendency of a slight underperformance of Private hospitals with the exception of "*Clinical data access rules*" where Public hospitals recorded the lowest score (81%). Conversely, Private not for profit hospitals systematically scored above the European average, the only exception being *"Broadband>50Mbps"* (29% vs. 32% European average).

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[59]   Clinical Care Information

Figure 2: European analysis by ownership type
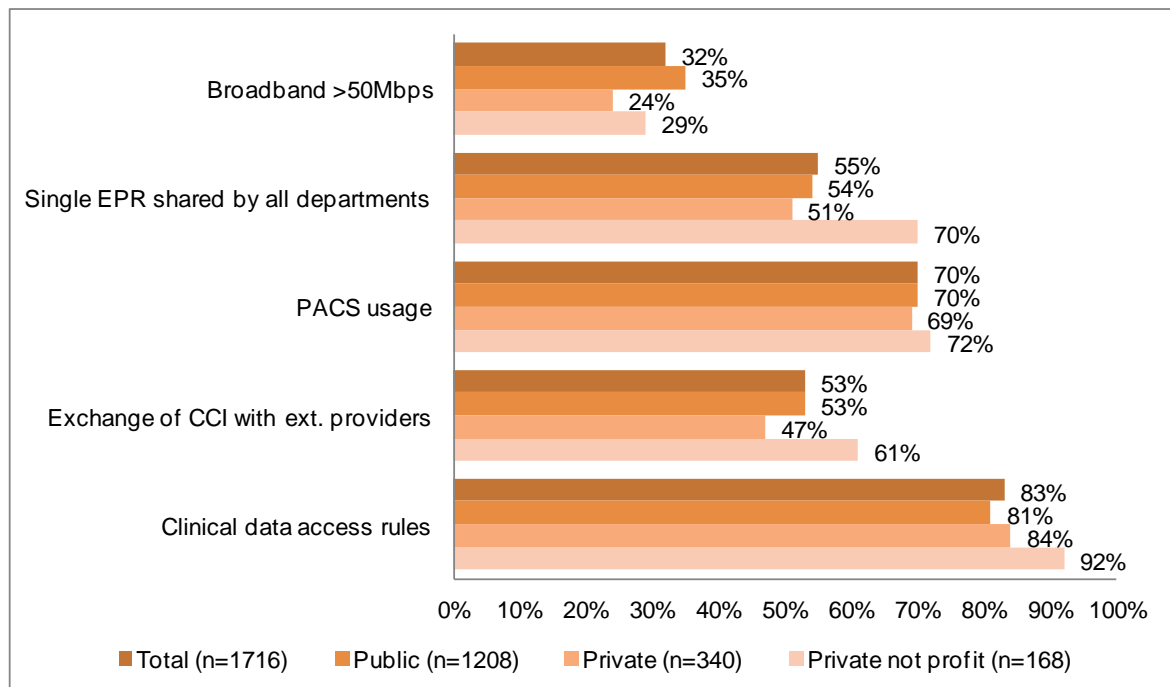
99   Taking hospital size into account, "*Clinical data access rules*" recorded the highest average results (82%), while "*Broadband>50Mbps*" and "*Exchange of CCI with ext. providers*" registered the lowest penetration rate. The biggest percentage difference was observed in "*Exchange of CCI with ext. Providers*" (33% difference between small and big hospitals) and "*PACS usage*" (30% between the smallest and the biggest hospital category).

100 There is a general trend for smaller hospitals to underperform in relation to the European averages and bigger hospitals. Large hospitals with more than 750 beds consistently reported higher implementation scores than smaller hospitals, save for the category "*Single EPR shared by all departments*", where the results were aligned to those of hospitals with between 251 and 750 beds.

Figure 3: European analysis by size of hospital

Figure 3: European analysis by size of hospital
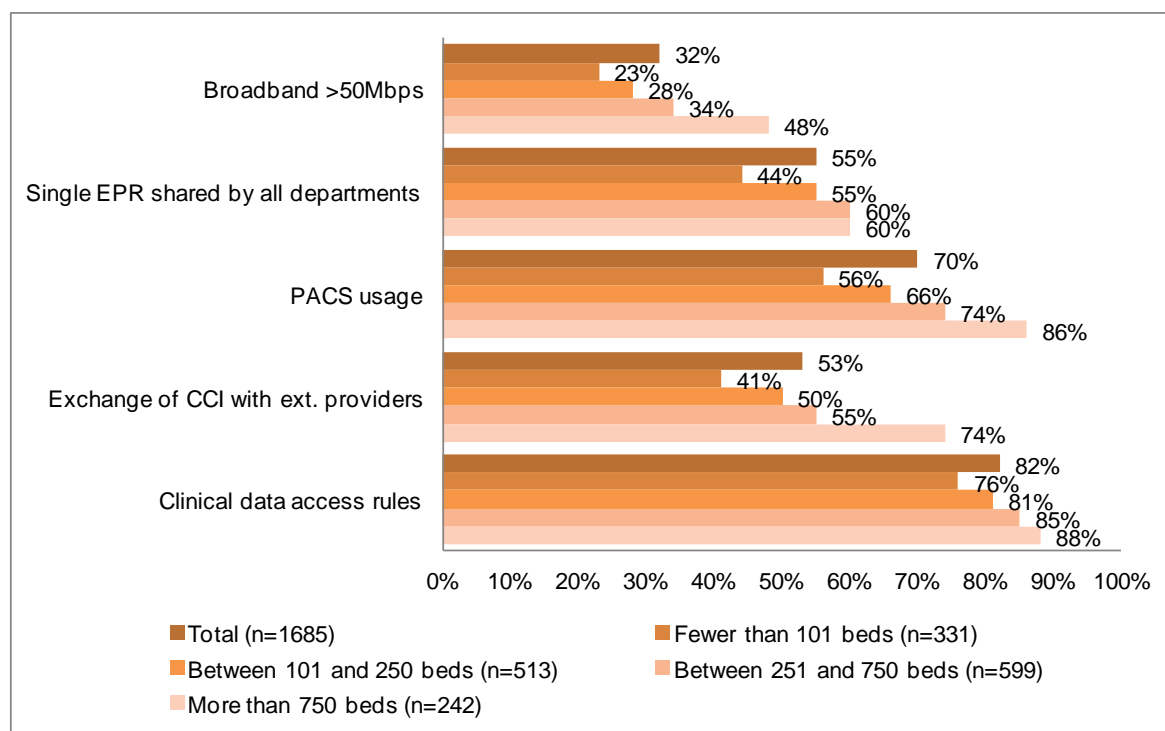
101 The remainder of this chapter provides a descriptive analysis of the answers related to the eHealth survey. The structure of this chapter follows the structure of the questionnaire:

- Block A. Characterisation of the surveyed hospitals (covering questions Q13 to Q16);
- Block B. ICT infrastructure (covering questions Q17 to Q22);
- Block C. ICT applications (covering questions Q23 to Q27);
- Block D. Health Information Exchange (covering questions Q28 to Q34);
- Block E. Security and privacy (covering questions Q35 to Q39);
- Block F. IT functionalities (covering questions Q40 to Q45);
- Block G. Hospital statistics has been excluded from analysis as many respondents were not willing or able to provide the quantitative data[60] requested in that block.

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60 i.e. hospital discharges, average length of stay, number of emergency visits, number of outpatient consultations – each item requested for the year 2011 or latest data available

4.2 Block A. Characterisation of the surveyed hospitals

102 This section covers questions Q13 to Q16 of the questionnaire and gives information on the general setup and context of the IT department. This covers: the part of the budget dedicated to IT, the extent to which services are outsourced, the presence of a formal IT strategic plan and the granting of incentives to adopt eHealth systems or applications.

Key findings of this survey block:
- A 63% majority of the hospitals surveyed devote less than 3% of their budget to IT.
- Nordic hospitals generally allocate a higher proportion of their budget to IT than other hospitals.
- Hospitals tend to keep their IT functionalities in-house instead of outsourcing them, but outsourcing is far from being insignificant.
- A slight majority of hospitals have a formalised strategic IT plan. The presence of an IT plan is generally observed more often in Western and Nordic countries than in other countries.
- Incentives tied to IT systems implementation are not very common, as 28% of hospitals surveyed receive such aids.
- While no significant trends or differences were observed between countries, there is a correlation for size and ownership, as both public and larger hospitals tend to receive more often incentives relating to IT systems than private and smaller hospitals.

4.2.1 IT budget vs. Hospital budget

103 First of all it is important to define the share of IT in European hospital budgets. This allows us to assess the future potential for IT deployment within the surveyed hospitals.

104 Figure 4 shows that 63% of hospitals are devoting up to 3% of their budget to IT, while the share of hospitals dedicating over 5% of their resources to the IT budget is particularly low (3%).

Figure 4: Part of the Hospital Budget represented by the IT budget, European level results

Answers to Q13: "What part of the total Hospital's budget does the IT budget represent?"

Base: n = 1753
Question Q13

Legend:
- Less than 1%
- Between 1% and 3%
- Between 3,1% and 5%
- More than 5%
- Don't know

28% — Less than 1%
35% — Between 1% and 3%
7% — Between 3,1% and 5%
3% — More than 5%
27% — Don't know
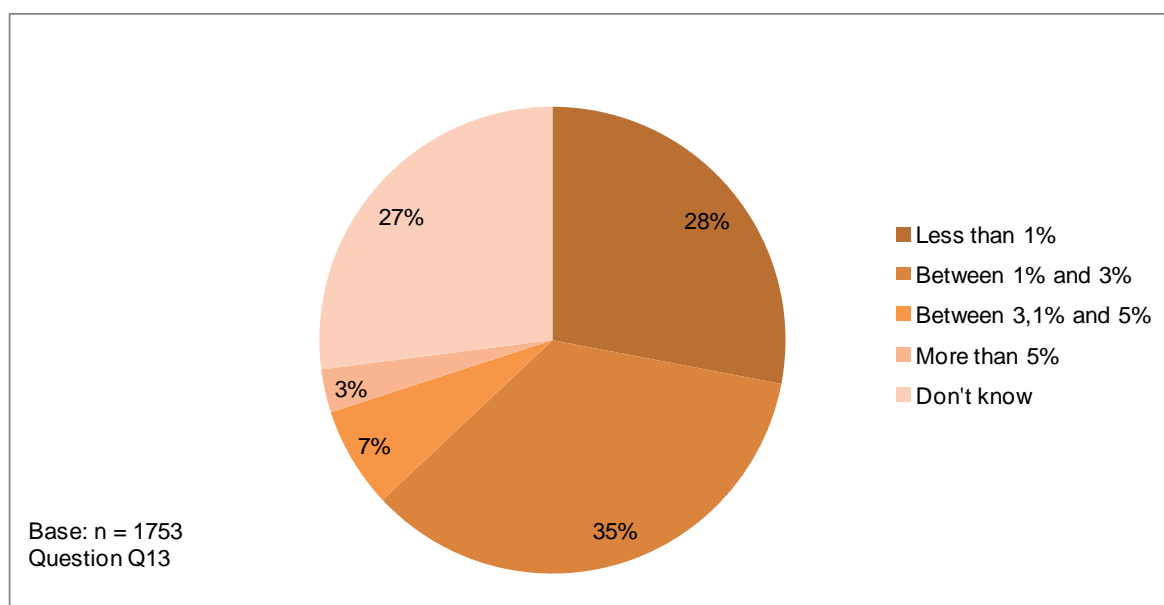
105 At the national level Luxembourg (33%), Norway (25%) and the Netherlands (14%) are the countries with the highest share of hospitals allocating more than 5% of their budget to IT. However, the predominant trend in Europe shows that most of the hospitals in the remaining countries devote a maximum of 3% of their budgets to IT. In particular, 85% of Finnish hospitals and 72% of Belgian hospitals dedicate between 1% and 3% to IT. Hospitals in Lithuania, Croatia, Poland and Ireland accounted for the lowest levels of

investment in IT: between 63% and 86% of hospitals in these countries dedicate less than 1% of their budget to IT.

Figure 5: Part of the Hospital Budget represented by the IT budget, Country-level results

Answers to Q13: "What part of the total Hospital's budget does the IT budget represent?"

Base: n = 1279
Question Q13

Less than 1%   Between 1% and 3%   Between 3,1% and 5%   More than 5%
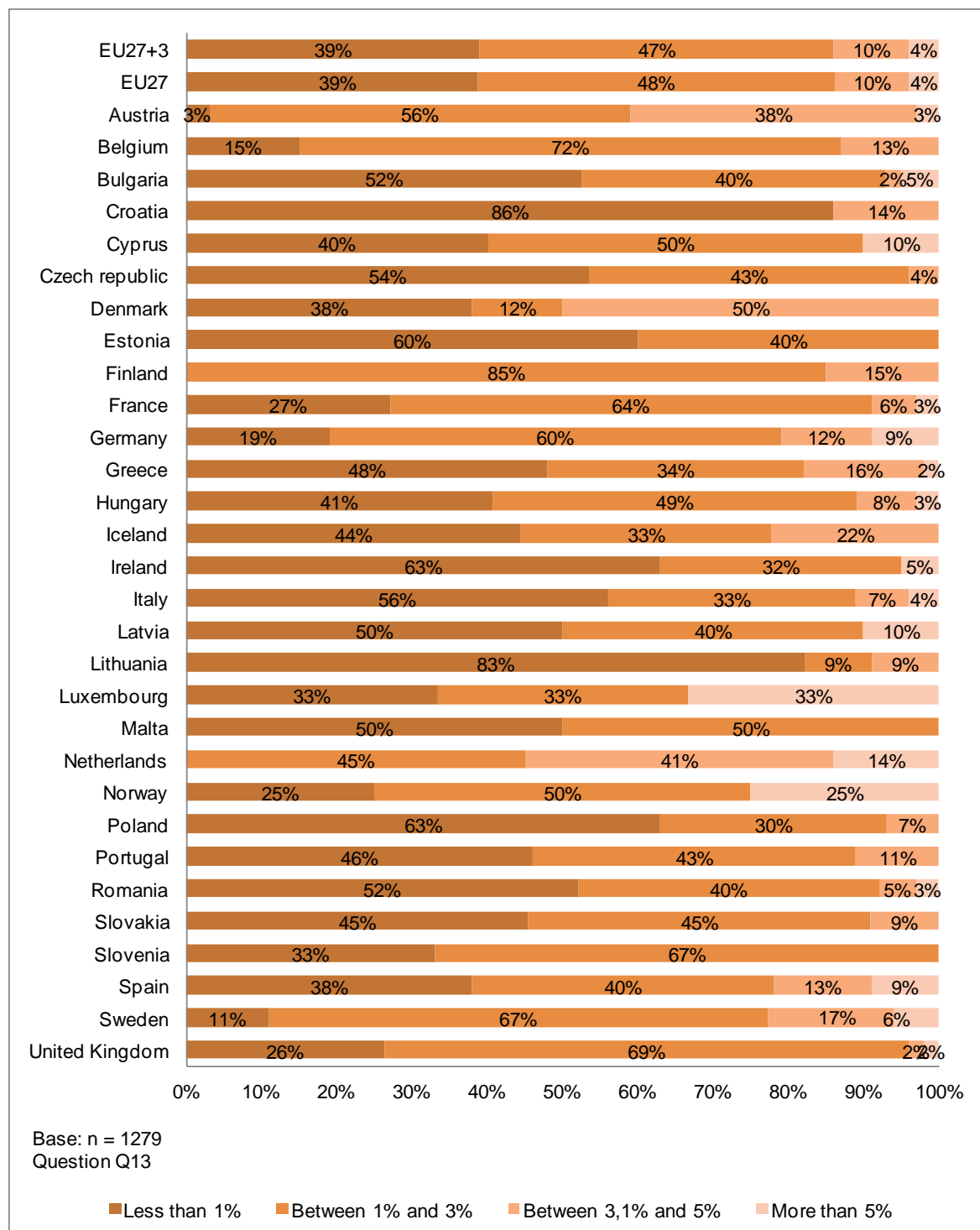
4.2.2 Outsourcing of services

106 There are several reasons why hospitals wish to outsource their IT services. Generally, outsourcing IT (and other) activities can enable a hospital to focus more on healthcare, reduce or have flexibility in operating costs and/or headcount, and have access to highly specialised staff with limited risks (as well as sharing these risks with the IT provider). The opposing strategy is for hospitals to have dedicated resources in-house in order to have more control over activities.

107 Most European acute care hospitals prefer to keep IT resources in-house: 71% of the hospitals surveyed dedicate less than 50% of their IT budget to outsourced activities, while 13% dedicate 50% or more of their IT budget to outsourcing.

Figure 6: Part of the IT budget dedicated to outsourced services, European level results

Answers to Q14: "What part of the IT budget is dedicated to outsourced services?"

Base: n = 1753
Question Q14

Legend:
- 0% (no service outsourced)
- Less than 25%
- Between 25% and 49%
- Between 50% and 74%
- At least 75%
- Don't know
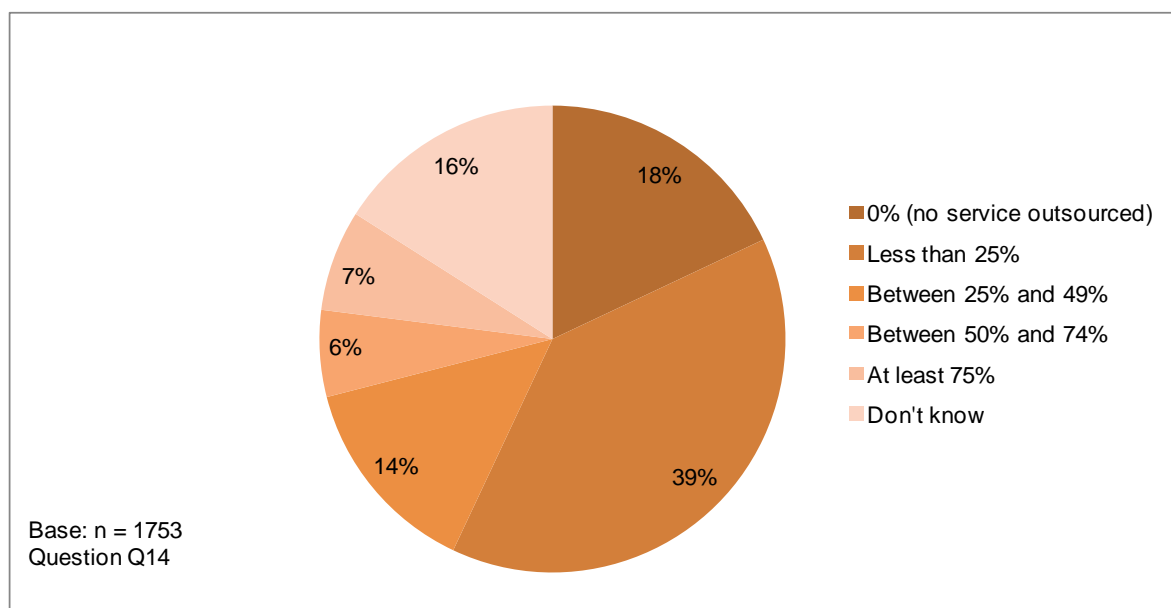
108 Globally, results are similar across countries, but hospitals in Latvia, Luxembourg, Denmark and Norway tend to keep their IT services in-house: in these countries less than half of the IT budget was dedicated to outsourced activities. On the other hand, hospitals in Malta, Slovenia, and Sweden outsource more their activities: more than 30% of hospitals in these countries use at least half of their budget for outsourced IT activities. These states are followed by Bulgaria, Cyprus, Estonia, Greece and Italy, where between 25% and 29% of hospitals dedicate at least half of their budget to outsourced IT activities.

Figure 7: Part of the IT budget dedicated to outsourced services, Country-level results

Answers to Q14: "What part of the IT budget is dedicated to outsourced services?"

	0% (no service outsourced)	Less than 25%	Between 25% and 49%	Between 50% and 74%	At least 75%
EU27+3	22%	46%	17%	8%	8%
EU27	22%	46%	17%	8%	8%
Austria	11%	57%	17%	3%	11%
Belgium	19%	44%	28%	5%	5%
Bulgaria	14%	53%	8%	14%	12%
Croatia	14%	57%	14%		14%
Cyprus	45%	18%	9%	9%	18%
Czech republic	15%	65%	15%	3%	3%
Denmark	67%		33%		
Estonia	55%	18%	18%		9%
Finland	32%	42%	5%	11%	11%
France	30%	45%	13%	7%	4%
Germany	18%	53%	20%	1%	8%
Greece	7%	44%	22%	15%	11%
Hungary	41%	37%	5%	5%	12%
Iceland	11%	56%	11%		22%
Ireland	37%	47%	11%		5%
Italy	16%	42%	17%	13%	12%
Latvia	50%	25%	25%		
Lithuania	16%	68%	8%	4%	4%
Luxembourg	33%	67%			
Malta					100%
Netherlands	25%	46%	17%	8%	4%
Norway	17%	33%	50%		
Poland	22%	49%	16%	8%	6%
Portugal	17%	36%	28%	11%	8%
Romania	42%	25%	15%	7%	11%
Slovakia	23%	37%	23%	7%	10%
Slovenia	17%	50%	17%		17%
Spain	18%	46%	21%	13%	2%
Sweden	21%	46%	8%		25%
United...	5%	63%	21%	2%	9%

Base: n = 1469
Question Q14

34

4.2.3   Presence of an IT strategic plan

109   In the context of acute hospitals, an IT strategic plan typically describes at least the as-is and to-be situations in terms of technologies, applications and IT infrastructure. Generally an IT strategic plan also includes a mission and a vision statement, objectives for the IT department, an assessment of the needs and requirements (in terms of infrastructure, staff, technologies, etc.), a description of the current and future projects intended to satisfy those needs, a budget and a method for a follow-up evaluation.

110   As shown in the figure below, a slight majority (57%) of the European hospitals have an IT strategic plan, as opposed to 40% of hospitals who do not have one.

Figure 8: Availability of a formal IT Strategic Plan in the IT Department, European level results

Answers to question Q15: "Does your IT Department have a formal IT Strategic Plan?"

Base: n= 1753
Question Q13
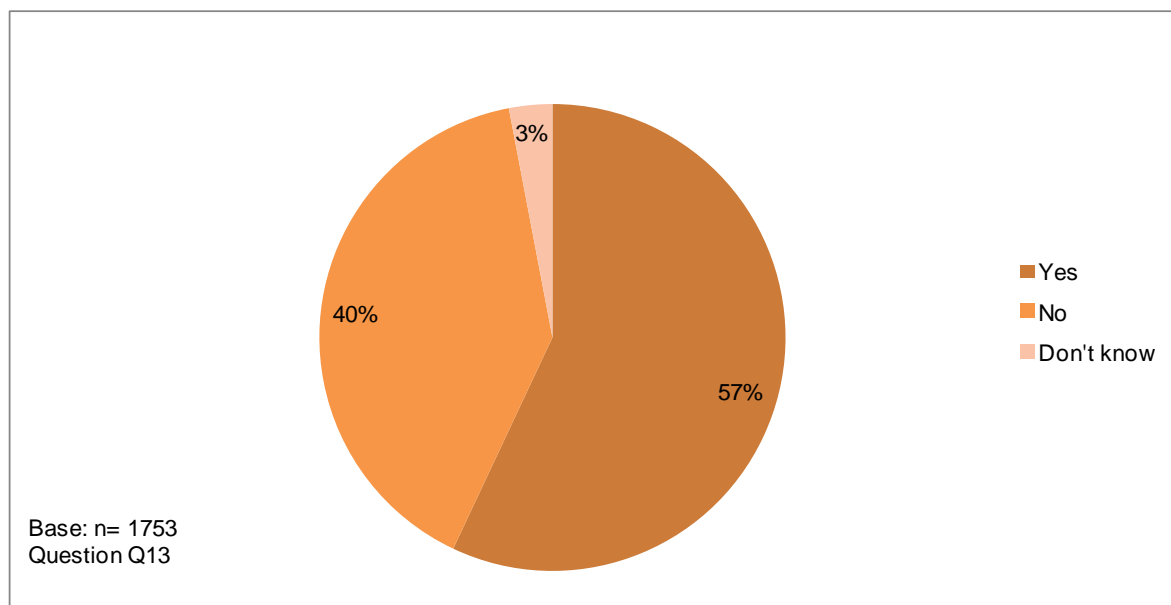
111   When analysing the data at national level, we see that southern and eastern European countries tend to lag behind in the formalisation of an IT strategy plan, especially in Lithuania and Poland where less than 30% of acute hospitals have one. Countries where approximately three quarters of hospitals have formalised an IT strategy plan include: Austria, Finland, Malta, Norway, Slovenia, Sweden and the UK (at least 74% of the hospitals in these countries have formalised such a plan).

Figure 9: Availability of a formal IT Strategic Plan in the IT Department, Country-level results

Answers to question Q15: "Does your IT Department have a formal IT Strategic Plan?"

Country	Yes	No
EU27+3	58%	42%
EU27	58%	42%
Austria	79%	21%
Belgium	56%	44%
Bulgaria	39%	61%
Croatia	64%	36%
Cyprus	62%	38%
Czech republic	62%	38%
Denmark	73%	27%
Estonia	64%	36%
Finland	77%	23%
France	71%	29%
Germany	55%	45%
Greece	45%	55%
Hungary	47%	53%
Iceland	44%	56%
Ireland	57%	43%
Italy	55%	45%
Latvia	61%	39%
Lithuania	23%	77%
Luxembourg	67%	33%
Malta	100%	
Netherlands	73%	27%
Norway	83%	17%
Poland	28%	72%
Portugal	63%	37%
Romania	52%	48%
Slovakia	34%	66%
Slovenia	83%	17%
Spain	68%	32%
Sweden	76%	24%
United Kingdom	98%	2%

Base: n = 1698
Question Q15

Yes   No

4.2.4 Financial incentives for IT systems

112 National or regional governments as well as other organisations can grant funding to hospitals in order to equip them or to foster the implementation or the use of eHealth applications.

113 About two thirds (63%) of European acute care hospitals do not receive any incentive, while 28% do. Figure 10 below illustrates these results.

Figure 10: Financial incentives tied to information technology systems, European level results

Answers to Q16: "Does your Hospital receive any financial incentives from health plans and other organisations that are tied to the types of information technology systems (e.g. electronic health records or electronic prescribing systems) it adopts?"

Base: n = 1753
Question Q16
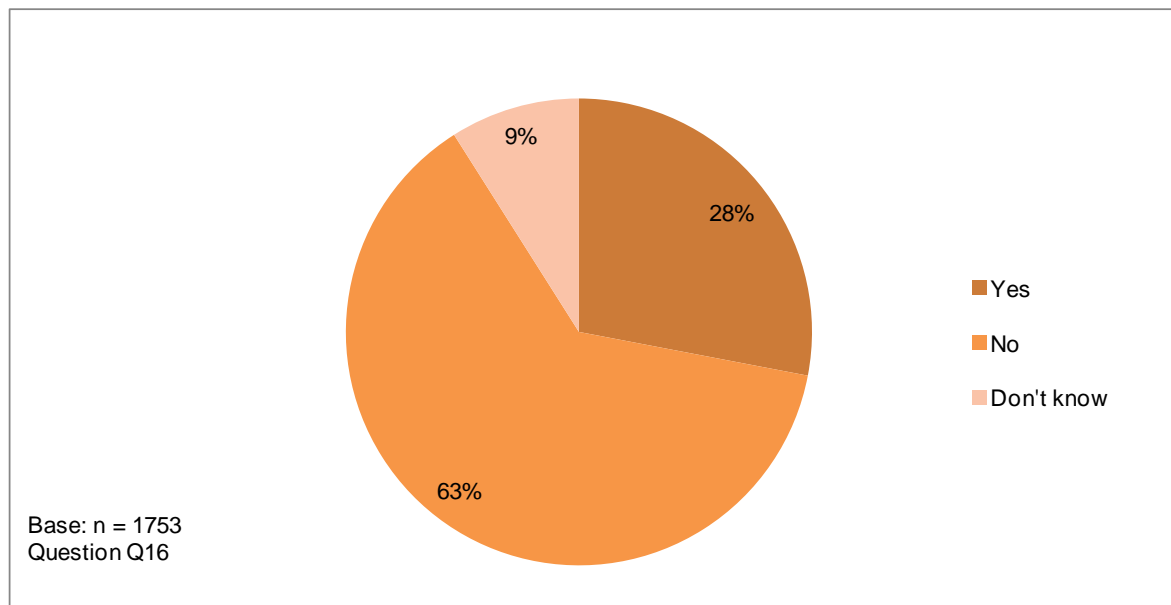
114 There is no correlation between the characteristics of the country (size, economic situation) and the level of subsidies granted to hospitals. The highest proportions of hospitals receiving incentives are observed in Luxembourg (100%), Croatia (64%), Greece (51%) and Sweden (50%). At the other end of the spectrum, the highest proportions of hospitals not receiving any incentive are seen in Hungary (91%), Finland (85%), Ireland (83%), Norway (83%), Bulgaria (81%) and Iceland (78%).

Figure 11: Financial incentives tied to information technology systems, Country-level results

Answers to Q16: "Does your Hospital receive any financial incentives from health plans and other organisations that are tied to the types of information technology systems (e.g. electronic health records or electronic prescribing systems) it adopts?"

Country	Yes	No
EU27+3	31%	69%
EU27	31%	69%
Austria	39%	61%
Belgium	37%	63%
Bulgaria	14%	86%
Croatia	64%	36%
Cyprus	36%	64%
Czech republic	14%	86%
Denmark	30%	70%
Estonia	30%	70%
Finland	15%	85%
France	49%	51%
Germany	23%	77%
Greece	58%	42%
Hungary	9%	91%
Iceland	22%	78%
Ireland	10%	90%
Italy	31%	69%
Latvia	43%	57%
Lithuania	44%	56%
Luxembourg	100%	
Malta		100%
Netherlands	22%	78%
Norway	17%	83%
Poland	29%	71%
Portugal	11%	89%
Romania	15%	85%
Slovakia	16%	84%
Slovenia	33%	67%
Spain	14%	86%
Sweden	59%	41%
United Kingdom	28%	72%

Base: n = 1603
Question Q16

■ Yes ■ No
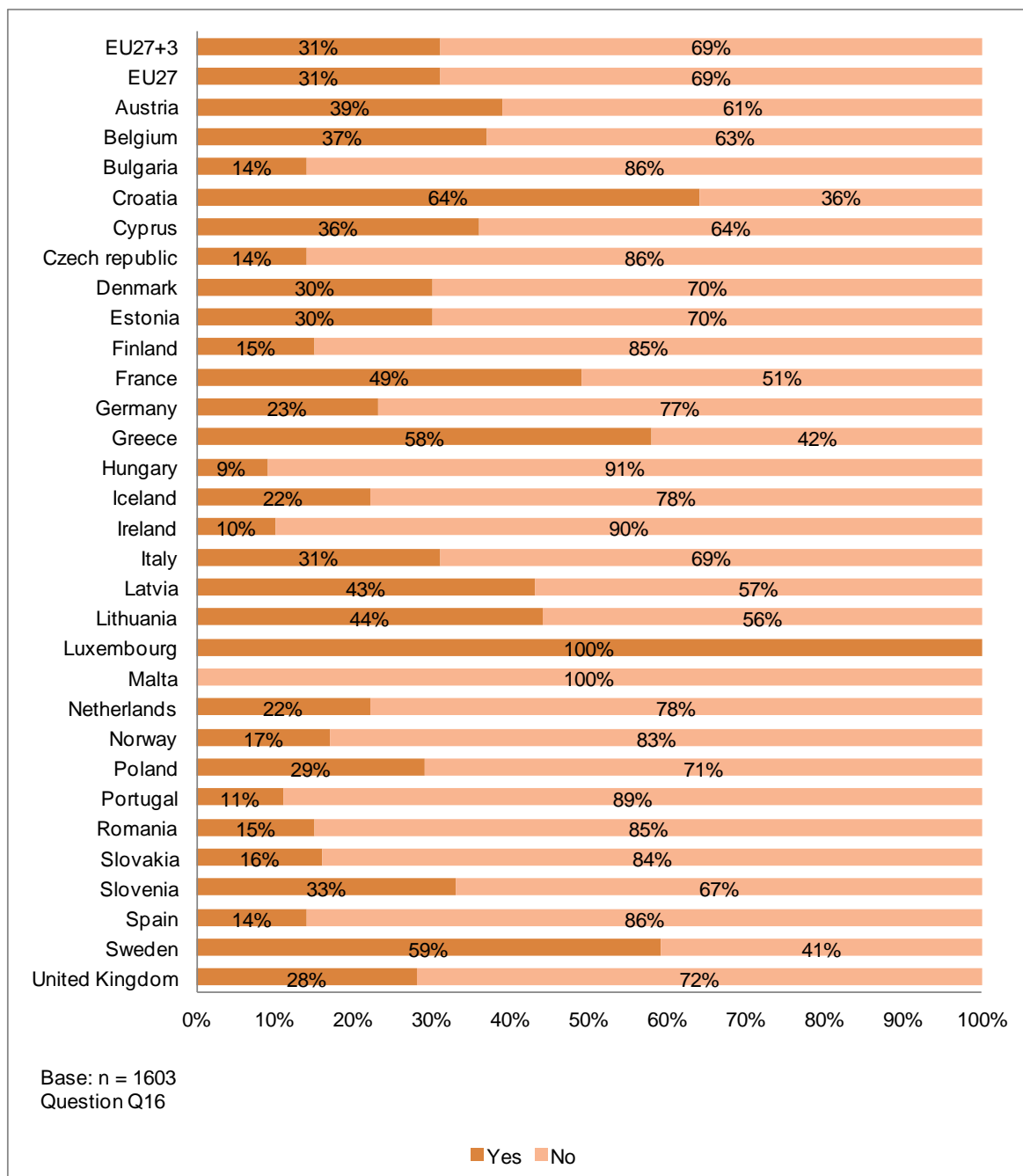
115 Public hospitals are more likely to receive financial incentives tied to information technology systems. Incentives were granted to 31% of public hospitals, but to only 20% of private hospitals. Private not for profit hospitals occupy an intermediate level, with 26% of them receiving such financial incentives.

Figure 12: Financial incentives tied to information technology systems, results by ownership

Answers to Q16: "Does your Hospital receive any financial incentives from health plans and other organisations that are tied to the types of information technology systems (e.g. electronic health records or electronic prescribing systems) it adopts?"

Base: n=1716
Question Q16

■ Total (n=1716) ■ Public (n=1208) ■ Private (n=340) ■ Private not for profit (n=168)
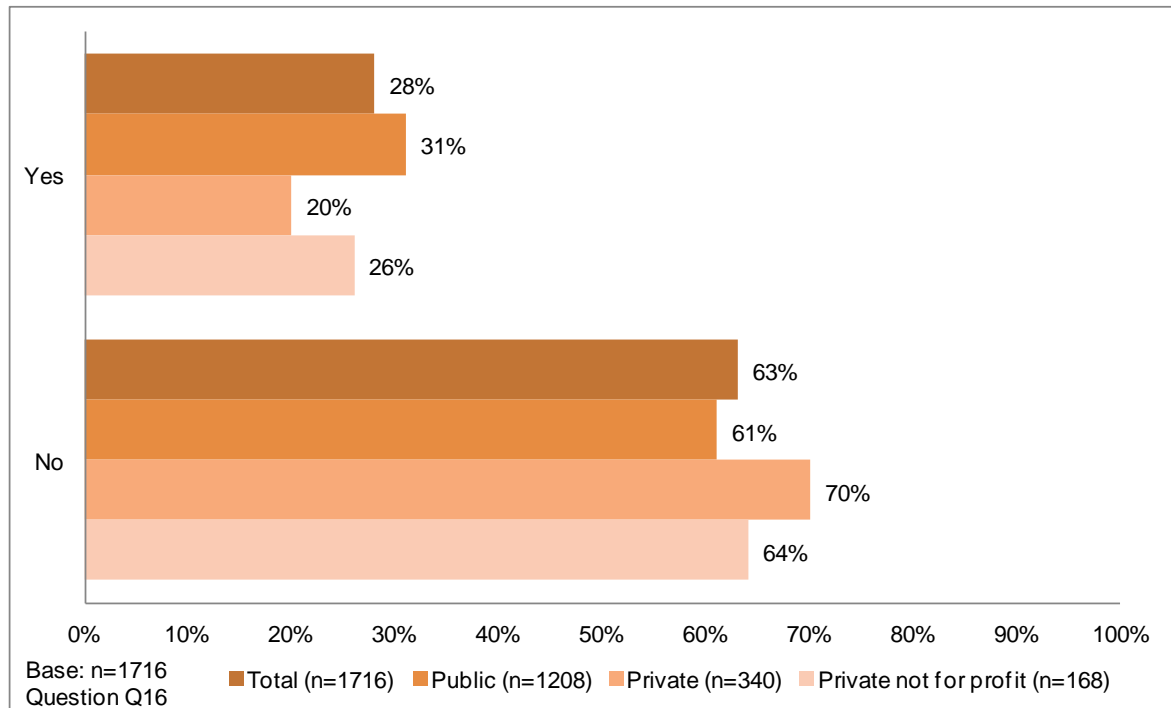
116 There is a clear correlation between the granting of financial aids relating to information technology systems and hospital size, as 36% of hospitals with more than 750 beds receive such aids, against 20% of hospitals with fewer than 101 beds. Medium-sized establishments stood in between, with financial incentives for IT going to 24% of hospitals with between 101 and 250 beds, and to 32% of hospitals with between 251 and 750 beds.

Figure 13: Financial incentives tied to information technology systems, results by size

Answers to Q16: "Does your Hospital receive any financial incentives from health plans and other organisations that are tied to the types of information technology systems (e.g. electronic health records or electronic prescribing systems) it adopts?"

Base: n = 1685
Question Q16

Legend:
- Total (n=1685)
- Fewer than 101 beds (n=331)
- Between 101 and 250 beds (n=513)
- Between 251 and 750 beds (n=599)
- More than 750 beds (n=242)

Yes:
- Total: 28%
- Fewer than 101 beds: 20%
- Between 101 and 250 beds: 24%
- Between 251 and 750 beds: 32%
- More than 750 beds: 36%

No:
- Total: 64%
- Fewer than 101 beds: 72%
- Between 101 and 250 beds: 65%
- Between 251 and 750 beds: 60%
- More than 750 beds: 59%
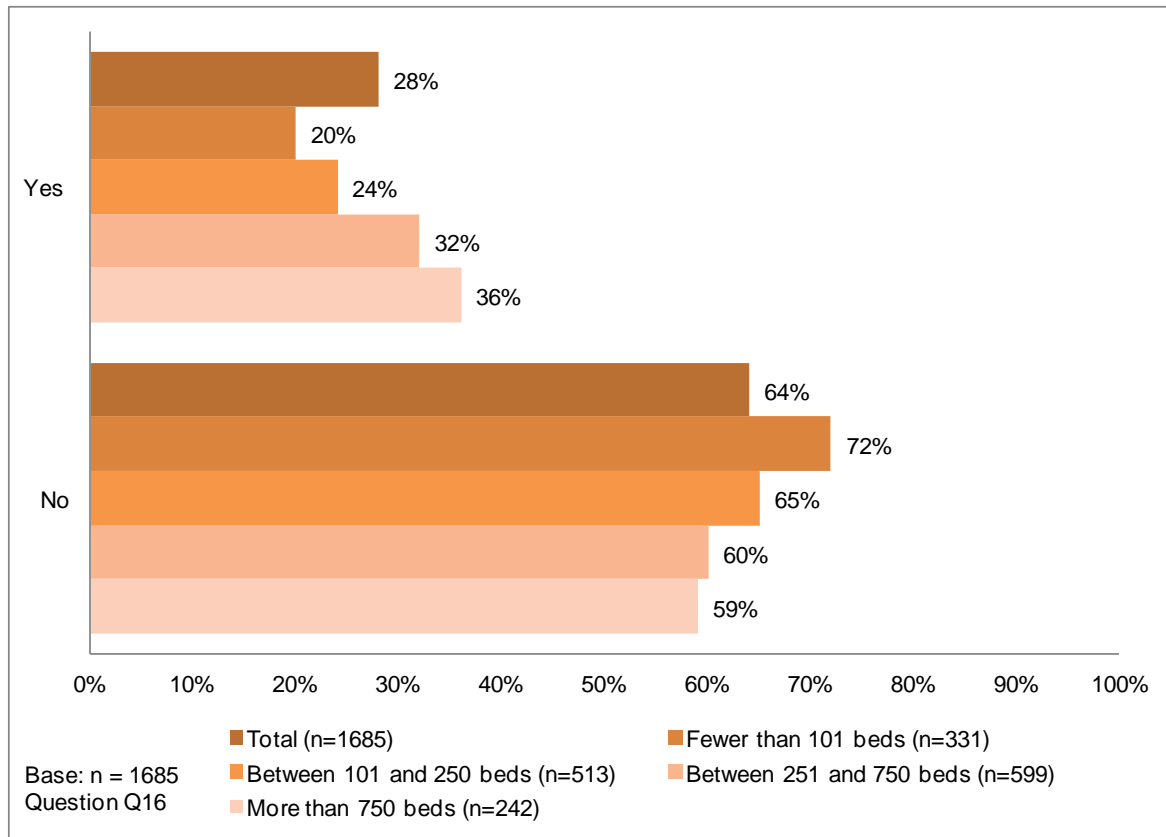
4.3 Block B. ICT infrastructure

117 Hospitals, national and regional governments and the European Commission have designed and implemented policies to foster systems connectivity. The cross-border healthcare[61] Directive requires Member States to connect healthcare providers throughout their territory (specifically the European Union "shall support and facilitate cooperation and the exchange of information among Member States working within a voluntary network connecting national authorities responsible for eHealth designated by the Member States"). This is intended to facilitate the transfer of healthcare data across borders.

Key findings of this survey block:

- Most European acute care hospitals have an independent hospital-wide computer system. Among the 34% of hospitals with a computer system that is part of a network, a slight majority are connected to the systems of other hospitals, while the remainder are connected at national or regional level.
- Hospitals in Eastern European countries tend to lag behind as regards the interconnectivity of their computer systems, while Nordic countries generally perform well.
- Almost 80% of the hospitals surveyed are externally connected, the majority of which use an extranet rather than a value-added network or proprietary infrastructure. Hospitals in Central and Eastern European countries are lagging behind in terms of external connections.
- On average, hospitals are not well equipped in terms of internet connections, as over half (56%) have a broadband connection below 50 Mbps, and only 16% have a fast connection above 100 Mbps.
- Eastern European countries generally accounted for a higher proportion of hospitals with a narrowband connection, while Nordic and Benelux countries recorded the highest proportion of hospitals with a fast broadband connection.
- Public hospitals and larger hospitals are generally better equipped than Private establishments and small and medium-sized hospitals with respect to the type of internet connection they use.
- Results regarding wireless communication are evenly distributed: 39% of hospitals have a single unified wireless network able to support most applications, while 32% have no wireless communications. The remainder have an individual wireless network.
- Countries behind in the implementation of a wireless infrastructure in their hospitals are located in Eastern, Southern and Central Europe, while those where it is most developed are the countries of Northern and Western Europe.
- Almost half of the surveyed hospitals have videoconferencing facilities. The countries where this proportion is the highest are mainly located in Northern Europe, whereas countries lagging behind are mostly located in Central and Eastern Europe.
- Management of IT services is generally kept in-house rather than outsourced. Countries in which outsourcing is most widely practiced are located in Western and Northern Europe.

4.3.1 Presence of a computerised system

118 Questions Q17 and Q18 relate to ICT connections in acute care hospitals. Question Q17 deals with the type of computer system used.

119 Almost all hospitals (96%) have a computer system as part of a hospital-wide computer system or network. The majority (62%) of European acute care hospitals have a computer system that is limited to the hospital, while 19% have connected their computer system with the systems of other hospitals; 15% of the surveyed hospitals have a nationally or regionally connected computer system. These results are very similar to those of the previous survey, in which 66% of the surveyed hospitals had an independent computer system, 17% had a computer system connected to the systems of other hospitals or other hospital sites and 14% had a computer system which was connected nationally or regionally. The figure below illustrates the 2012 survey results.

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[61] Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare.

Figure 14: Presence of a computer system in the hospital, European level results

Answers to Q17: "Do you have a computer system in your hospital?"

Base: n = 1753
Question Q17

Legend:
- PC's not part of hospital-wide system
- Independent hospital-wide computer system
- Computer systems part of a network of different hospitals
- Computers systems part of a regional or national network
- Don't know

Pie chart values: 1%, 3%, 15%, 19%, 62%
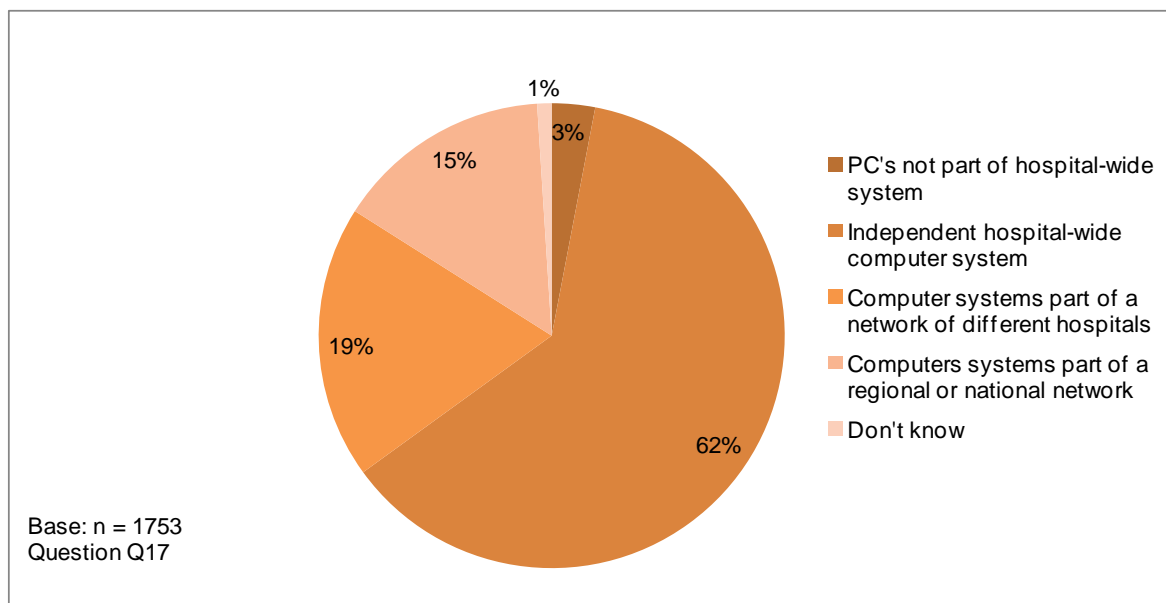
120 At national level, Cyprus recorded the highest proportion of PCs not being part of a hospital-wide system (23%). Eastern European countries also tend to lag behind as regards the interconnectivity of hospital computer systems: a comparatively high share of hospitals in Lithuania (16%), Poland (13%) and Romania (8%) declared having personal computers that are not part of a hospital-wide system. In contrast, Nordic countries display a higher proportion of hospitals having a computer system connected nationally or regionally, as is the case in more than half of the surveyed hospitals of Denmark, Iceland and Sweden. In Ireland, Malta, Spain and the UK, results are also largely above the European average.

Figure 15: Presence of a computer system in the hospital, Country-level results

Answers to Q17: "Do you have a computer system in your hospital?"

Base: n = 1740
Question Q17

- PC's not part of hospital-wide system
- Independent hospital-wide computer system
- Computer systems part of a network of different hospitals
- Computers systems part of a regional or national network
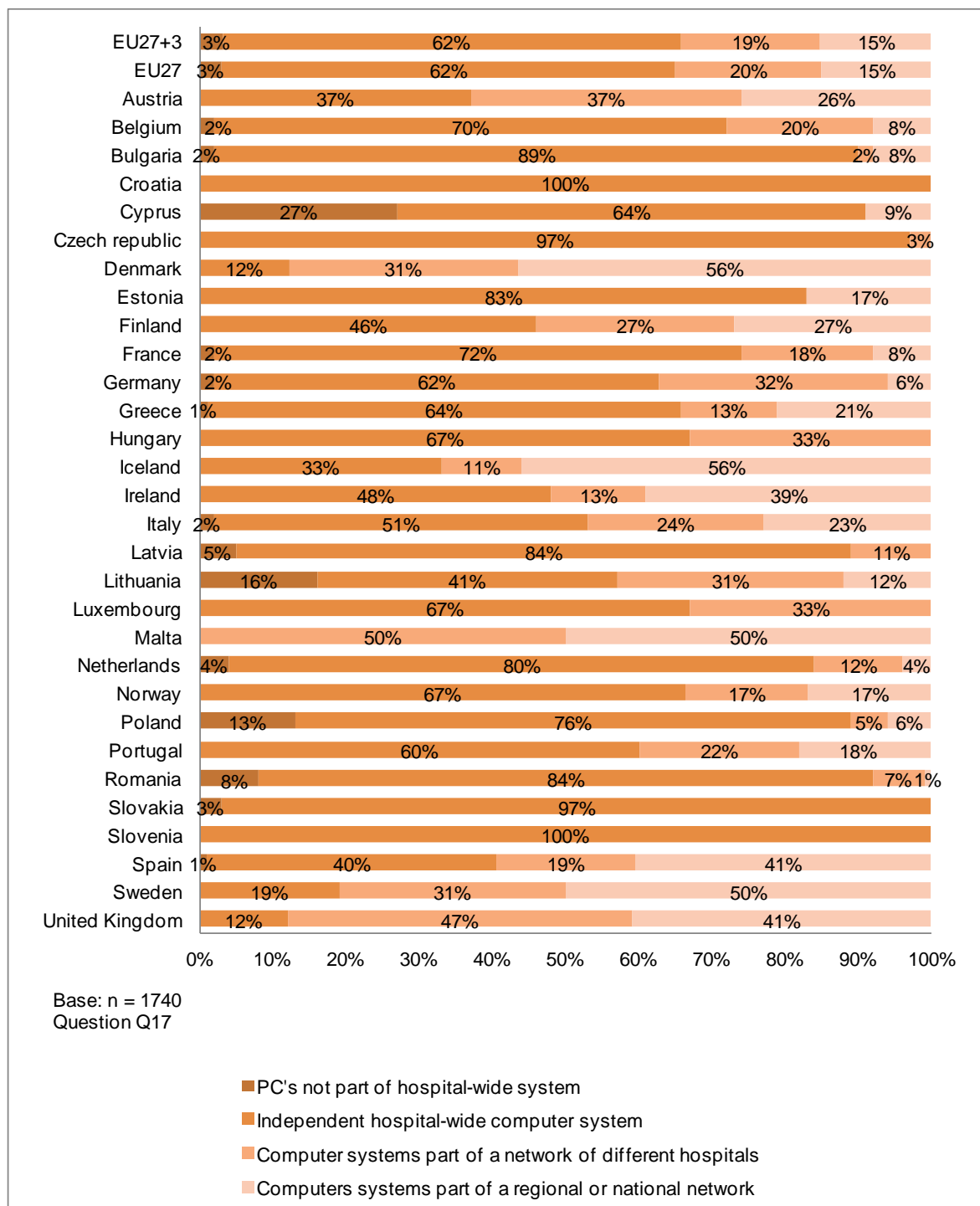
4.3.2   Availability of external connections

121   Among the hospitals which do have a computer system, 19% are not externally connected, as shown in Figure 16. This result is similar to what was observed in the previous survey (18%). For those hospitals that have a computer system which is externally connected, the majority use an extranet (52% of the overall answers) and/or a value-added network or proprietary infrastructure (35% of the respondents).

Figure 16: Presence of an externally connected computer system, European level results

Answers to Q18: Is your hospital computer system externally connected…?"

Base: n = 1687
Question Q18
Multiple answers allowed
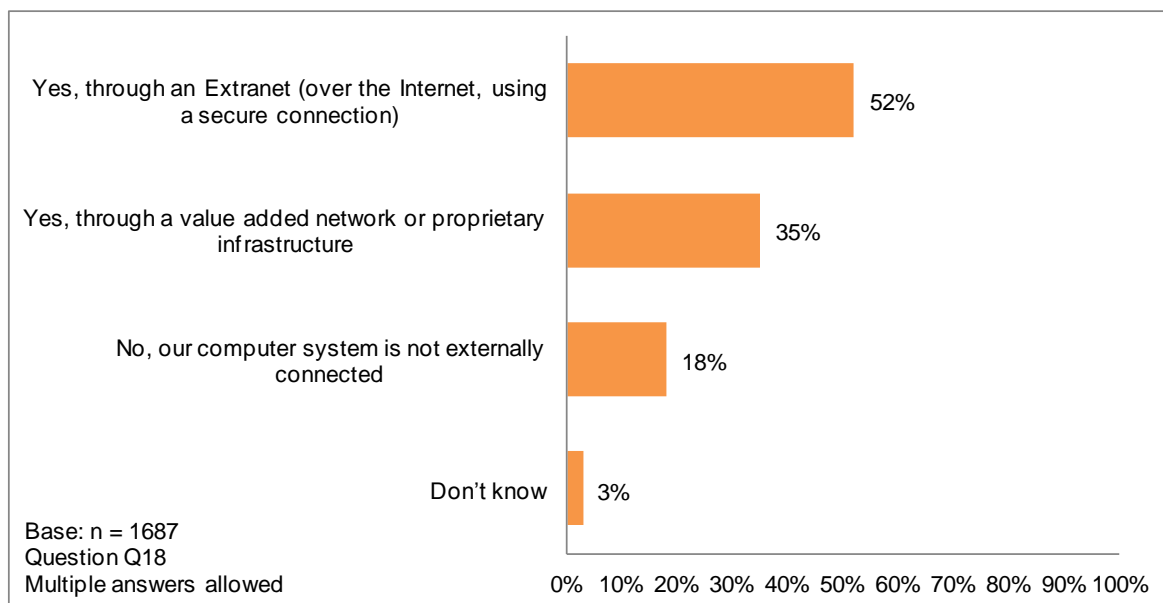
122   Central and Eastern European countries (such as Bulgaria, Czech Republic, Hungary, Poland, Slovakia) and Malta have the highest proportion of hospitals not externally connected (at least 35% of answers). Conversely, all the interviewed hospitals in Croatia, Estonia, Luxembourg and Norway are externally connected. There seems to be no country specificity (size, geographical situation within Europe, economic situation) that clearly influences the decision to opt for an extranet or a value-added network.

Figure 17: Presence of an externally connected computer system, Country-level results

Answers to Q18: Is your hospital computer system externally connected…?"

Base: n=1687 Question Q18 Multiple answers allowed	Through an Extranet (over the Internet, using a secure connection)	Through a value added network or proprietary infrastructure	Our computer system is not externally connected
EU27+3	52%	35%	18%
EU27	52%	36%	18%
Austria	65%	53%	9%
Belgium	63%	39%	4%
Bulgaria	48%	13%	38%
Croatia	100%	0%	0%
Cyprus	50%	0%	25%
Czech republic	54%	13%	44%
Denmark	56%	31%	6%
Estonia	75%	25%	0%
Finland	50%	46%	15%
France	40%	41%	24%
Germany	60%	41%	10%
Greece	55%	18%	24%
Hungary	35%	35%	37%
Iceland	78%	11%	11%
Ireland	43%	30%	17%
Italy	68%	33%	11%
Latvia	78%	11%	6%
Lithuania	70%	11%	11%
Luxembourg	67%	33%	0%
Malta	50%	0%	50%
Netherlands	50%	42%	21%
Norway	83%	33%	0%
Poland	8%	55%	35%
Portugal	45%	52%	15%
Romania	83%	10%	8%
Slovakia	31%	19%	56%
Slovenia	83%	17%	17%
Spain	52%	53%	7%
Sweden	69%	27%	15%
United Kingdom	65%	22%	4%

4.3.3   Type of internet connection available

123   In 2004, the European Commission expressed the need for healthcare systems to have increased access to high-speed connections and to broadband connections for providing eHealth services[62]. Question 19 refers to the internet connection speed available to hospitals.

124   In Europe, 3% of the surveyed hospitals reported having a narrowband connection, which is significantly less than in the previous survey (7%), whereas an important proportion (56%) declared having a broadband connection below 50 Mbps, which is similar to previous survey results. Interestingly, only 16 % of the surveyed hospitals have a fast connection above 100 Mbps, which is less than in the previous survey (24%).

Figure 18: Type of internet connection available in the hospital, European level results

Answers to Q19: "What type of Internet connection does your hospital have?"

Base: n = 1753
Question Q19
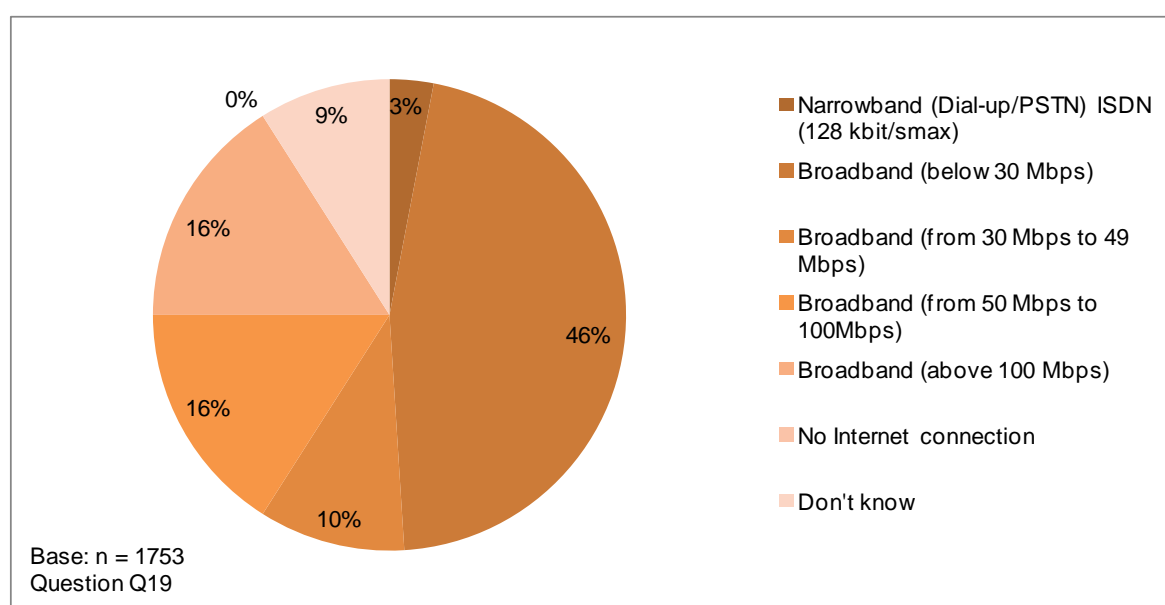
125   Eastern countries generally reported higher proportions of hospitals equipped with a narrowband connection, with Cyprus (30%), Bulgaria (12%), Croatia (9%), Greece and Romania (both 8%) recording the highest shares. On the other hand, it is in Nordic countries (Denmark, Estonia, Finland and Sweden) and in the Benelux where the proportion of hospitals having a broadband connection above 100 Mbps is the highest.

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[62]   eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area, European Commission, COM (2004) 356 final.

Figure 19: Type of internet connection available in the hospital, Country-level results

Answers to Q19: "What type of Internet connection does your hospital have?"

Base: n= 1598
Question Q19

Legend:
- Narrowband (Dial-up/PSTN) ISDN (128 kbit/smax)
- Broadband (below 30 Mbps)
- Broadband (from 30 Mbps to 49 Mbps)
- Broadband (from 50 Mbps to 100Mbps)
- Broadband (above 100 Mbps)
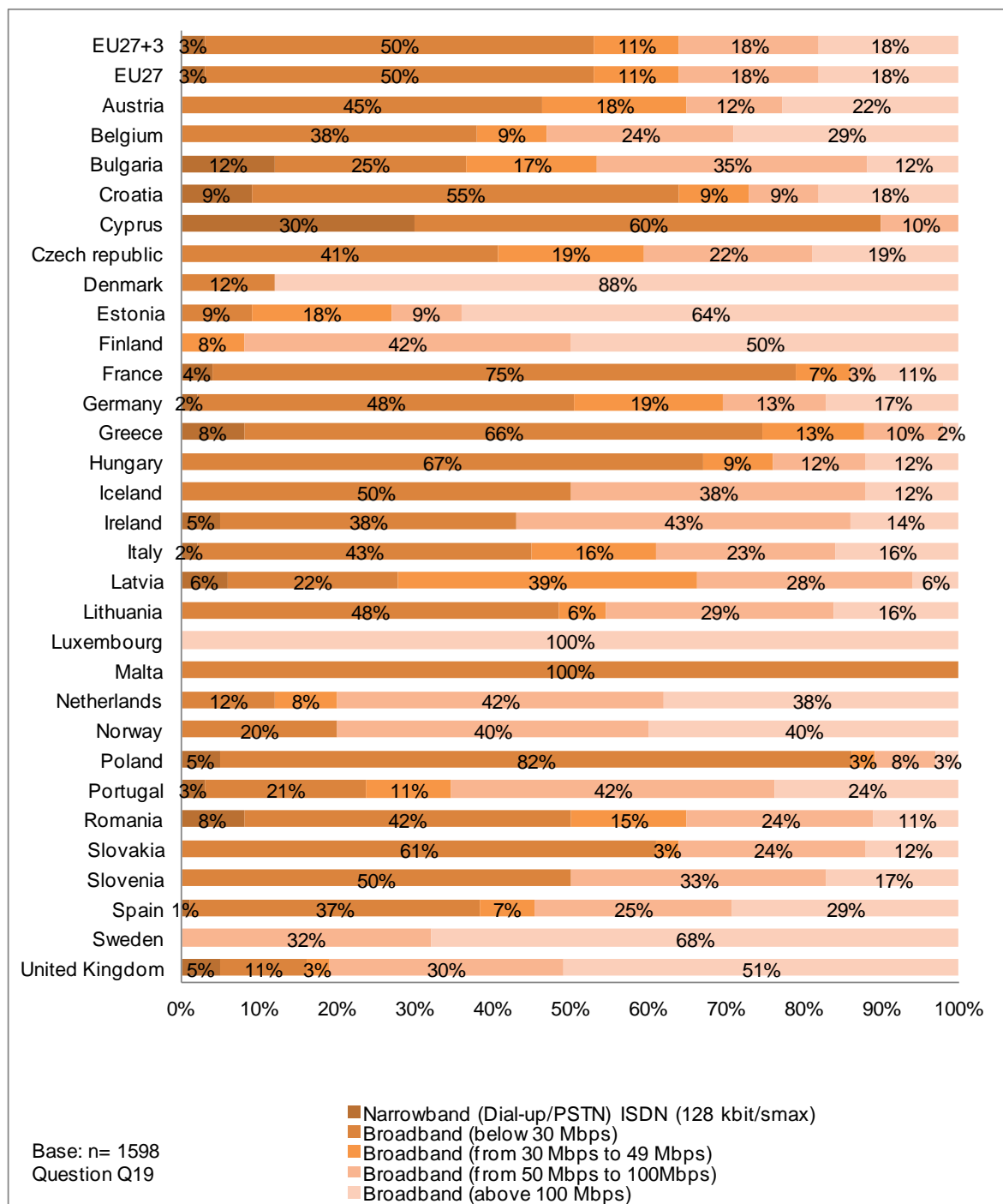
126 The size and ownership analysis indicates that Public hospitals are generally better equipped than Private establishments in relation to the type of internet connection they use. Even though the most intensively used broadband category is the category below 30 Mbps (used by 46% on average across hospital types), the public-private gap in terms of high Mbps broadband can be seen in Figure 20. 18% of Public hospitals have a broadband connection above 100 Mbps compared to only 9% of Private hospitals, while 5% of Private hospitals still have a narrowband connection, compared to 3% of Public hospitals. By and large, Private not for profit hospitals lie in an intermediate position between these two categories in terms of internet connection performance.

Figure 20: Type of internet connection available in the hospital, results by ownership

Answers to Q19: "What type of Internet connection does your hospital have?"
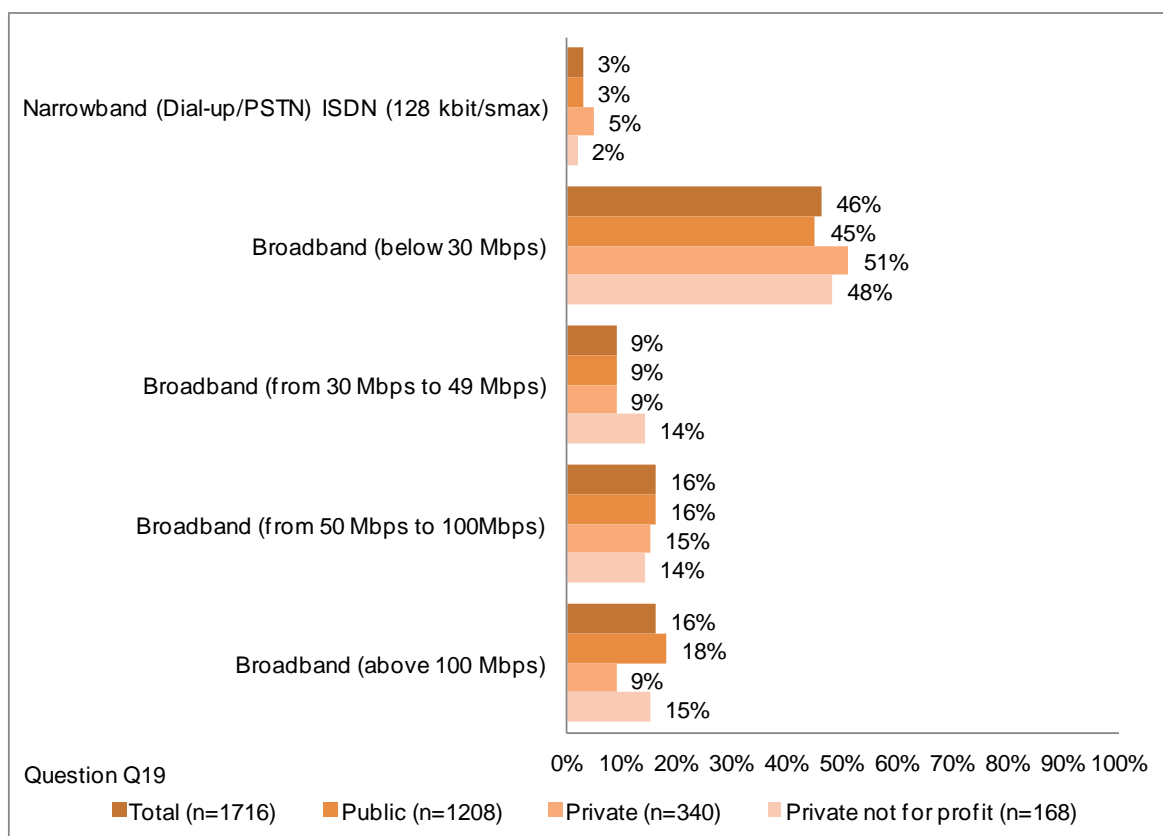
127 Larger hospitals are generally better-equipped than small and medium-sized hospitals in terms of internet connection: 29% of hospitals with more than 750 beds have a Broadband connection above 100 Mbps, as compared with 9% of hospitals with fewer than 101 beds, while on average 15% of hospitals of intermediate size have this type of connection.

128 At the other end of the spectrum we see that the largest users of narrowband internet are the smallest hospitals, 6% of whom have a reliance on narrowband. Broadband below 30 Mbps is still the most extensively used type of broadband (43,5% across all size categories).

Figure 21: Type of internet connection available in the hospital, results by size

Answers to Q19: "What type of Internet connection does your hospital have?"
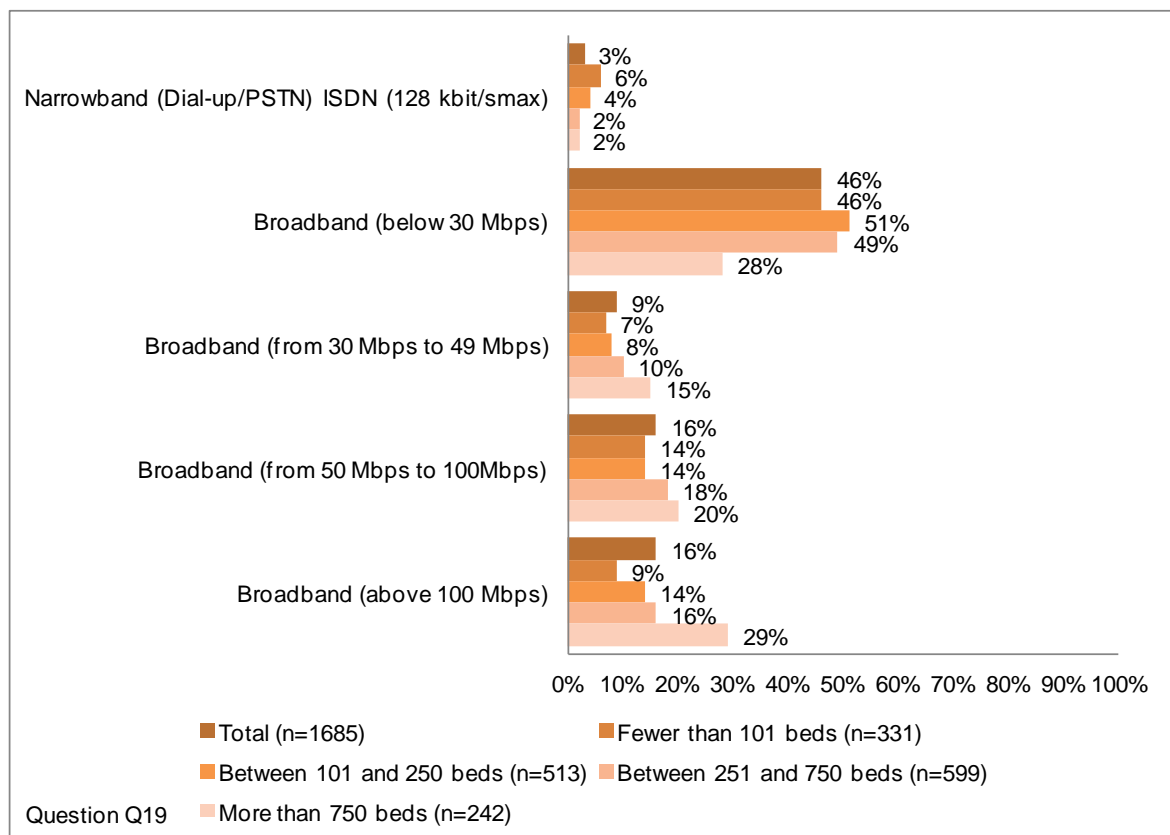
4.3.4 Wireless communications support types

129 Wireless communication in hospitals could enhance efficiency in the quality of healthcare services. With wireless connections, healthcare professionals can be more efficient in obtaining medical records, in delivering treatments, in making decisions during critical health events and in prioritising actions. The figure below presents the wireless communication systems available in European hospitals. Just under one third (32%) of the surveyed hospitals have no wireless infrastructure, which contrasts favourably with the percentage from the last survey (46%). Also, 39% of the hospitals have a single unified wireless network able to support most applications. This result is slightly higher than in the last survey (35%).

Figure 22: Presence and type of wireless communication supported by the hospital, European level results

Answers to Q20: "How does your hospital support wireless communications?"
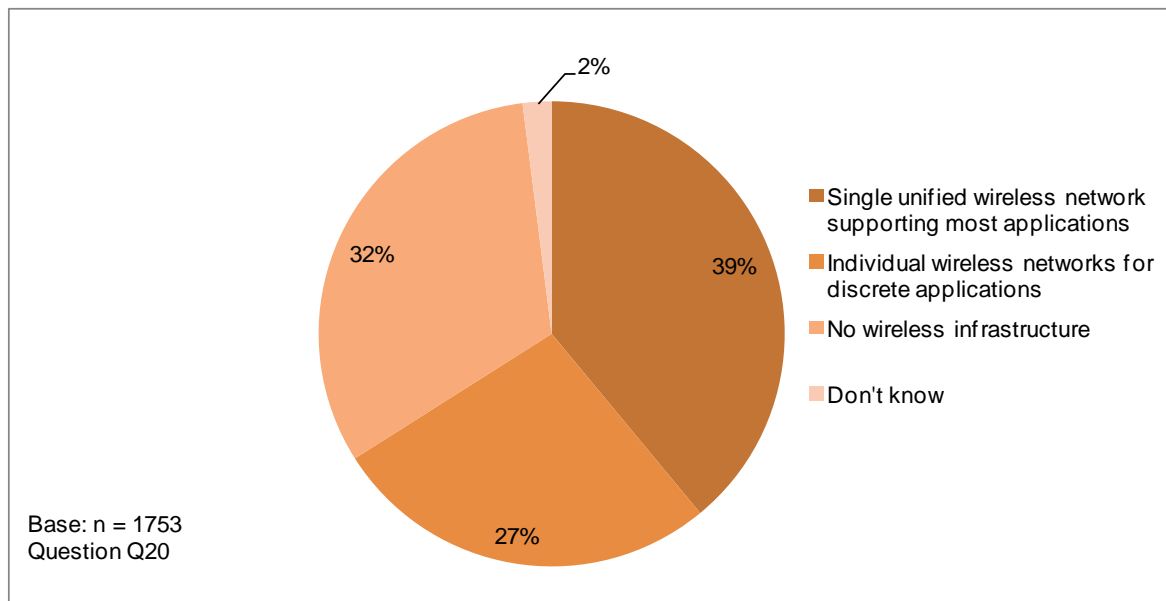
130 Countries running late in the implementation of a wireless infrastructure in their hospitals are located in Eastern Europe (Poland 71%; Lithuania 62%; Romania and Hungary 60%), Southern Europe (Greece 68%; Malta 50%) and Central Europe (Hungary 60%; Czech Republic 51%).The countries where wireless infrastructure is most developed — with a unified network supporting most applications — are Luxembourg (100%), Denmark (80%) and Sweden (76%).

Figure 23: Presence and type of wireless communication supported by the hospital, Country-level results

Answers to Q20: "How does your hospital support wireless communications?"

Country	Single unified wireless network supporting most applications	Individual wireless networks for discrete applications	No wireless infrastructure
EU27+3	40%	27%	33%
EU27	40%	27%	33%
Austria	60%	37%	2%
Belgium	69%	18%	12%
Bulgaria	17%	28%	55%
Croatia	18%	45%	36%
Cyprus	58%	25%	17%
Czech republic	26%	23%	51%
Denmark	80%	13%	7%
Estonia	33%	33%	33%
Finland	65%	31%	4%
France	67%	21%	12%
Germany	27%	29%	44%
Greece	12%	21%	68%
Hungary	5%	35%	60%
Iceland	22%	56%	22%
Ireland	39%	43%	17%
Italy	36%	39%	25%
Latvia	26%	42%	32%
Lithuania	12%	25%	62%
Luxembourg	100%		
Malta		50%	50%
Netherlands	58%	42%	
Norway	17%	50%	33%
Poland	12%	17%	71%
Portugal	50%	32%	18%
Romania	13%	27%	60%
Slovakia	20%	30%	50%
Slovenia	50%	17%	33%
Spain	55%	26%	19%
Sweden	76%	20%	4%
United Kingdom	64%	19%	16%

Base: n = 1724
Question Q20

■ Single unified wireless network supporting most applications
■ Individual wireless networks for discrete applications
■ No wireless infrastructure

4.3.5 Videoconferencing

131 Hospital videoconferencing facilities can be used for a variety of applications, such as consultations with other healthcare professionals, patient monitoring or consultations, continuing medical education, etc. Videoconferencing allows better access to healthcare, including for people living in rural areas; it can also reduce healthcare costs and improve efficiency by decreasing physicians' on-site consultations and by avoiding patient transfers.

132 Almost half (46%) of the surveyed hospitals have videoconferencing facilities. This result is higher than that observed in the previous survey (39%).

Figure 24: Presence of videoconferencing facilities in the hospital, European level results

Answers to Q21: "Does your hospital have videoconferencing facilities (for home monitoring of patients, contact with other institutions for administrative, medical or education purposes)?"

Base: n = 1753
Question Q21

- 1%
- 45% Yes
- 54% No
- Don't know
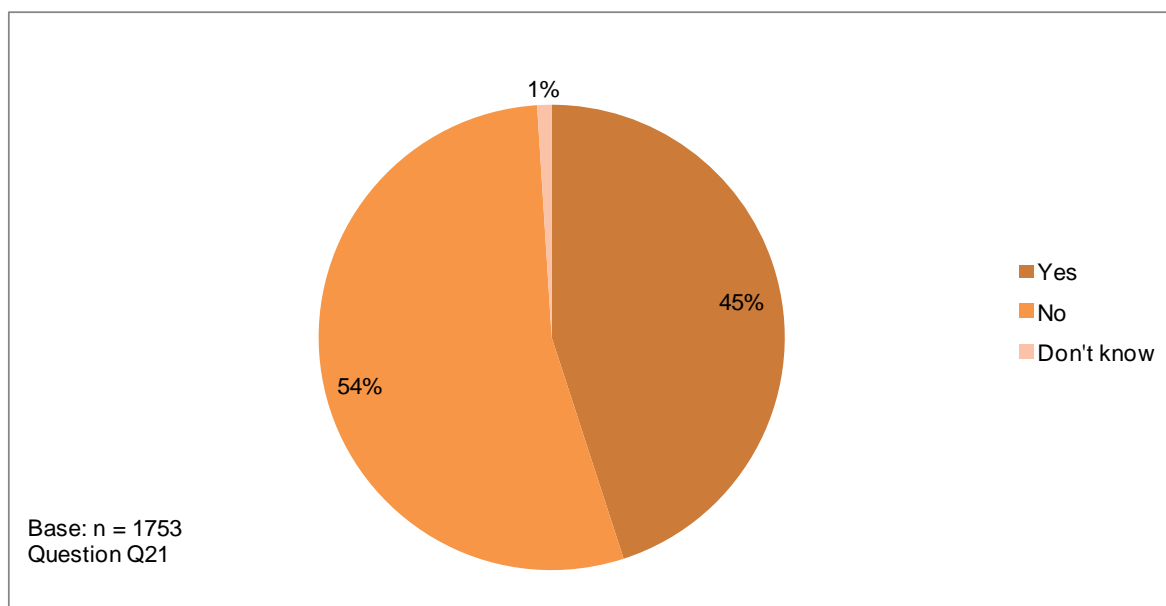
133 Hospital videoconferencing facilities are predominantly available in Northern Europe. More than 75% of the surveyed hospitals in Denmark, Finland, Iceland, Ireland, the Netherlands, Sweden and the UK have such facilities. Countries lagging behind are mostly located in Central/Eastern Europe (Bulgaria, Hungary, Latvia, Poland and Slovakia) where less than one quarter of the hospitals have videoconferencing facilities.

Figure 25: Presence of videoconferencing facilities in the hospital, Country-level results

Answers to Q21: "Does your hospital have videoconferencing facilities (for home monitoring of patients, contact with other institutions for administrative, medical or education purposes)?"

Country	Yes	No
EU27+3	45%	55%
EU27	45%	55%
Austria	63%	37%
Belgium	46%	54%
Bulgaria	20%	80%
Croatia	73%	27%
Cyprus	31%	69%
Czech republic	32%	68%
Denmark	81%	19%
Estonia	67%	33%
Finland	92%	8%
France	60%	40%
Germany	38%	62%
Greece	25%	75%
Hungary	12%	88%
Iceland	78%	22%
Ireland	83%	17%
Italy	40%	60%
Latvia	22%	78%
Lithuania	50%	50%
Luxembourg	67%	33%
Malta	50%	50%
Netherlands	88%	12%
Norway	67%	33%
Poland	13%	87%
Portugal	34%	66%
Romania	33%	67%
Slovakia	15%	85%
Slovenia	33%	67%
Spain	56%	44%
Sweden	80%	20%
United Kingdom	84%	16%

Base: n = 1743
Question Q21

■Yes ■No
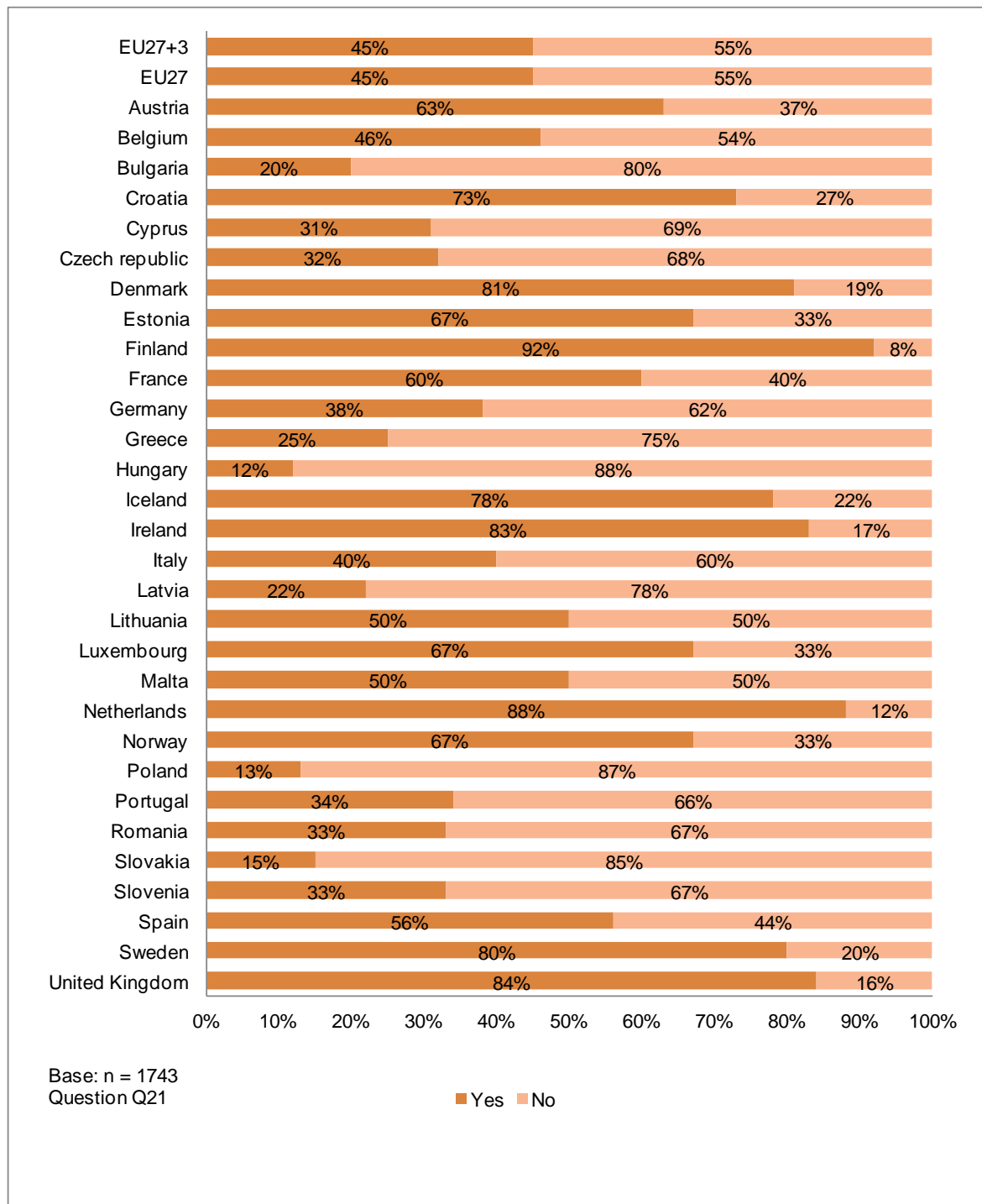
4.3.6   Management of services

134   Question 22 is intended to obtain information on how hospitals prefer to manage IT services. Factors that might influence a hospital's strategy in this area are diverse, and can include the following: the presence of existing internal resources, potential concerns about security, confidentiality or protection of outsourced data, the lack of incentives or available budget, absence of reliable or competent partners or adequate solutions corresponding to the hospital's needs, a limited internal infrastructure and legislation restrictions.

135   Interestingly, the outsourcing strategy differs little according to the type of services provided at European level. In-house management varies from 55% for "*Hosting of e-mails and website*" to 91% for "*Recording and storage of patient's medical digital data or other clinical data*", "*Issue of invoices*" and "*Supplier invoice management*". All the other categories have somewhat similar performance with percentages of in-house service management ranging between 76% and 89%.

Figure 26: Type of managed services, European level results

Answers to Q22: "How are you currently managing the following services?"

Base: n = 1753
Question Q22

■ Currently managed in-house   ■ Currently outsourced   ■ Don't know
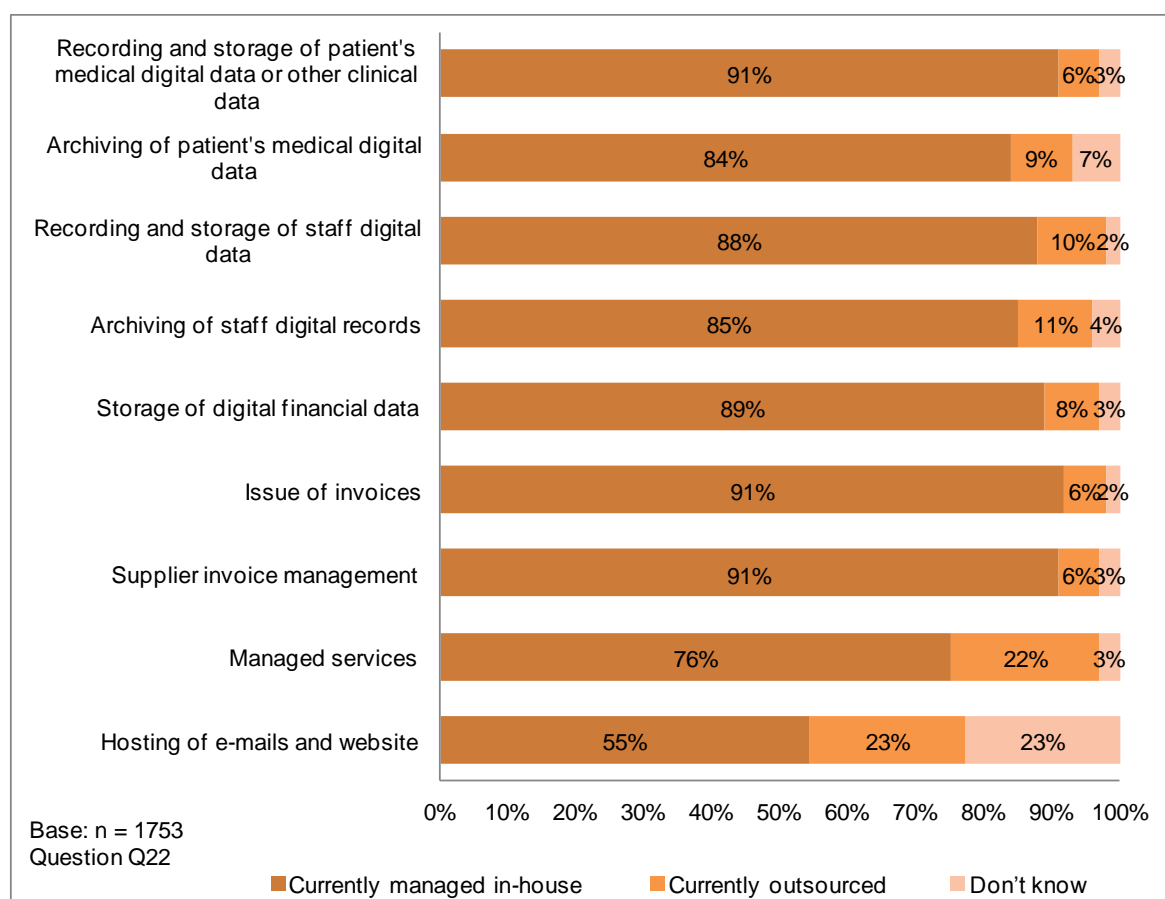
136   Data at national level show a predominance of in-house management as well. Croatia, Luxembourg, Slovakia and Slovenia are fully managing in-house the majority of their IT activities. Countries in which these IT services are largely outsourced are Austria, Iceland and Sweden, and to a lesser extent Finland, France and Germany.

Figure 27: Type of services currently outsourced, Country-level results

Answers to Q22: "How are you currently managing the following services?"

Currently outsourced Base: n=1753 Question Q22	Recording and storage of patient's medical digital data or other clinical data	Archiving of patient's medical digital data	Recording and storage of staff digital data	Archiving of staff digital records	Storage of digital financial data	Issue of invoices	Supplier invoice management	Managed services	Hosting of e-mails and website
EU27+3	6%	9%	10%	11%	8%	6%	6%	22%	23%
EU27	6%	9%	9%	11%	8%	6%	6%	21%	23%
Austria	14%	14%	35%	40%	35%	26%	26%	21%	37%
Belgium	0%	0%	12%	10%	8%	10%	2%	14%	8%
Bulgaria	0%	0%	3%	3%	3%	2%	0%	42%	18%
Croatia	0%	0%	0%	0%	0%	0%	0%	27%	18%
Cyprus	15%	8%	0%	0%	0%	0%	0%	8%	8%
Czech republic	2%	2%	8%	8%	8%	8%	8%	15%	20%
Denmark	19%	25%	6%	6%	0%	6%	6%	12%	6%
Estonia	17%	8%	0%	0%	0%	0%	0%	0%	8%
Finland	8%	8%	23%	27%	19%	4%	19%	35%	8%
France	5%	7%	8%	10%	6%	7%	6%	16%	23%
Germany	9%	13%	25%	28%	19%	9%	9%	19%	28%
Greece	7%	6%	4%	4%	4%	4%	4%	16%	31%
Hungary	5%	5%	7%	9%	0%	0%	0%	21%	5%
Iceland	22%	33%	33%	22%	44%	0%	11%	11%	22%
Ireland	9%	22%	4%	4%	4%	4%	4%	22%	4%
Italy	11%	26%	11%	14%	12%	8%	7%	36%	28%
Latvia	11%	21%	0%	0%	5%	11%	11%	37%	21%
Lithuania	12%	9%	6%	3%	0%	0%	0%	31%	12%
Luxembourg	0%	0%	0%	0%	33%	0%	33%	0%	0%
Malta	50%	50%	0%	0%	0%	0%	0%	50%	50%
Netherlands	4%	4%	8%	19%	4%	8%	4%	0%	4%
Norway	0%	0%	0%	0%	0%	33%	17%	33%	17%
Poland	2%	2%	1%	1%	1%	0%	0%	26%	13%
Portugal	2%	2%	2%	2%	2%	2%	5%	12%	15%
Romania	2%	5%	1%	4%	2%	1%	0%	32%	49%
Slovakia	0%	0%	0%	3%	3%	0%	0%	21%	9%
Slovenia	0%	0%	0%	0%	0%	0%	0%	33%	33%
Spain	6%	6%	5%	8%	7%	4%	7%	15%	25%
Sweden	19%	19%	23%	27%	23%	23%	31%	19%	12%
United Kingdom	4%	12%	9%	3%	6%	0%	12%	10%	29%

4.4 Block C. ICT applications

137 This section covers questions Q23 to Q27 referring to the type of Electronic Medical/Health/Patient Record used, Picture Archiving and Communication System as well as systems and applications integrated by the hospital. These areas reflect the sophistication of the data management systems employed by acute hospitals across Europe as well as the approximate level of digitisation of records and departure from paper-based systems.

Key findings of this survey block:
- More than 80% of the surveyed hospitals use an EMR/EHR/EPR system. More specifically 55% use a hospital-wide EMR/EHR/EPR.
- Southern and Eastern European countries tend to use EMR/EHR/EPRs the least.
- The distribution of EMR/EHR/EPR availability between private and the public hospitals is comparable.
- The bigger hospitals are, the more they tend to have EMR/EHR/EP and the more they tend to share information.
- The vast majority of hospitals (90%) still do not provide online access to their electronic patient records.
- 70% of the European acute care hospitals have a Picture Archiving and Communication System (PACS).
- Forerunners in PACS usage are mainly situated in Western and Northern Europe, while countries lagging behind are France and those located in Southern/Eastern/Central Europe.
- There is no significant difference in PACS usage between hospitals according to their ownership status.
- There is a correlation based on size and PACS usage, as the bigger the establishments are, the more they rely on a PACS.
- Computerised systems for billing management, transmission of results of clinical tests, appointment booking, medical/nursing document management are well implemented, with a European average above 60%.
- Integrated systems for Tele-radiology, ePrescribing, adverse health events reporting, service order placing, critical care information, and business intelligence information ranges from 40% to 60%.
- Other systems, such as those for sending or receiving electronic referral letters or electronic discharge letters, medical decision support, Tele-homecare/Tele-monitoring services to outpatients are less well implemented, with a European average below 40%.
- Most of the Nordic and the small/middle-sized countries of Western Europe are the most advanced in terms of implementation of computerised systems or applications, whereas Eastern European countries tend to lag behind. Other countries are in line with the European average.

4.4.1 Electronic Medical/Health/Patient Record

138 An electronic record is a file containing information about the patient's current health and history. Patient records used to be kept as hard paper copies, but this method is largely being phased out. With the development of IT healthcare professionals have started to store patient data virtually with Electronic Medical Records (EMRs), Electronic Health Records (EHRs) and Electronic Patient Records (EPRs).

139 EMR/EHR/EPR refers to three different definitions:
- An **EMR** is the electronic record of health-related information on an individual that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organisation who are involved in the individual's health and care.[63]
- An **EHR** is the aggregate electronic record of health-related information on an individual that is created and gathered cumulatively across more than one health care organisation and is managed and consulted by licensed clinicians and staff involved in the individual's health and care. [64]
- An **EPR** is a record about an individual patient stored in a healthcare provider's computer, in a database that is typically the property of the provider. It will usually contain the patient's demographic data and medical information collected only when the patient visits that provider.[65]

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63 http://www.nursetogether.com/nurse-informatics-spotlight-emr-vs-ehr, accessed 20 June 2013
64 Ibidem.
65 http://www.avazmd.com/resources/emr_cpr_ehr.html, accessed 20 June 2013

140   The use of EMR/EHR systems is critical for sharing information between healthcare professionals. Directive 2011/24/EU[66] has set up an eHealth network aiming to draw up guidelines on a non-exhaustive list of data to be included in patients' summaries and that can be shared between health professionals to enable continuity of care and patient safety across borders.

141   Figure 28 shows that only 16% of the surveyed hospitals do not use any EMR/EHR/EPR. This result is slightly lower but comparable to that of the previous survey (19%). Nevertheless, when hospitals have an EMR/EPR/EHR system, progress has been made as regards information sharing: in 2012/2013, only 6% of respondents declared having a multiple local/departmental EMR/EHR/EPR system not sharing information, representing a 5 percentage point decrease over 2010. 55% of European hospitals use a hospital-wide EMR/EHR/EPR, while 20% use a multiple EMR/EHR/EPR system sharing information with a central system. These two results are lower than those of the previous survey, which may be due to the fact that multiple answers were allowed in the 2010 questionnaire.

Figure 28: Type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) used by the hospital, European level results

Answer to Q23: "Which type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) does your hospital mainly use?"

Base: n = 1753
Question Q23
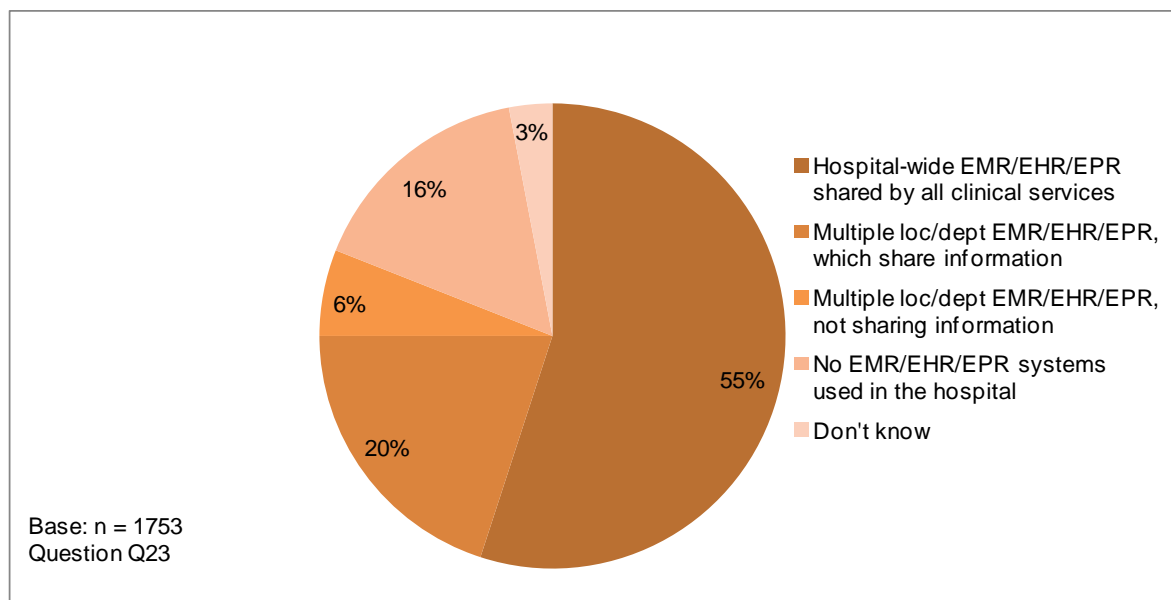
142   Southern (Cyprus, Greece) and Eastern (Lithuania, Poland) European countries, together with Slovenia, Ireland and the UK are those using EMR/EHR/EPRs the least. By contrast, Estonia (100%), Hungary (86%), Slovakia (82%), Croatia (82%) and Denmark (82%) are the most advanced countries with respect to the use of EMR/EHR/EPR systems in hospitals.

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[66]   Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare.

Figure 29: Type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) used by the hospital, Country-level results

Answer to Q23: "Which type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) does your hospital mainly use?"

Country	Hospital-wide EMR/EHR/EPR shared by all clinical services	Multiple loc/dept EMR/EHR/EPR, which share information	Multiple loc/dept EMR/EHR/EPR, not sharing information	No EMR/EHR/EPR systems used in the hospital
EU27+3	57%	21%	6%	16%
EU27	57%	21%	6%	16%
Austria	73%	22%	2%	2%
Belgium	73%	22%	2%	2%
Bulgaria	39%	25%	18%	18%
Croatia	82%	9%		9%
Cyprus	56%			44%
Czech republic	82%	3%	3%	13%
Denmark	87%			13%
Estonia	100%			
Finland	80%			20%
France	65%	14%	6%	15%
Germany	63%	21%	4%	12%
Greece	52%	10%	3%	35%
Hungary	86%	12%		2%
Iceland	33%	67%		
Ireland	30%	17%	17%	35%
Italy	30%	38%	8%	25%
Latvia	75%	12%		12%
Lithuania	23%	30%	10%	37%
Luxembourg	33%	67%		
Malta	50%	50%		
Netherlands	73%	27%		
Norway	67%	33%		
Poland	50%	7%	7%	36%
Portugal	62%	38%		
Romania	61%	17%	4%	18%
Slovakia	82%	3%	6%	9%
Slovenia	33%	17%	17%	33%
Spain	50%	45%	2%	3%
Sweden	79%	12%	4%	4%
United Kingdom	40%	15%	22%	24%

Base: n= 1693
Question Q23

■ Hospital-wide EMR/EHR/EPR shared by all clinical services
■ Multiple loc/dept EMR/EHR/EPR, which share information
■ Multiple loc/dept EMR/EHR/EPR, not sharing information
■ No EMR/EHR/EPR systems used in the hospital

143 The distribution of EMR/EHR/EPR availability is broadly comparable across private hospitals and public hospitals. However, some differences can be highlighted: for example, public hospitals tend to have more multiple local/departmental EMR/EHR/EPRs which share information than private hospitals. The penetration of this type of electronic record keeping averaged 22% for public hospitals, compared to 15% for private hospitals. However, these percentages are reversed when considering the absence of EMR/EHR/EPR systems.

144 The highest penetration of hospital-wide EMR/EHR/EPR shared by all clinical services was observed in Private not for profit hospitals (70%), a result which is statistically significantly higher than for the other types of establishments.

Figure 30: Type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) used by the hospital, results by ownership

Answer to Q23: "Which type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) does your hospital mainly use?"
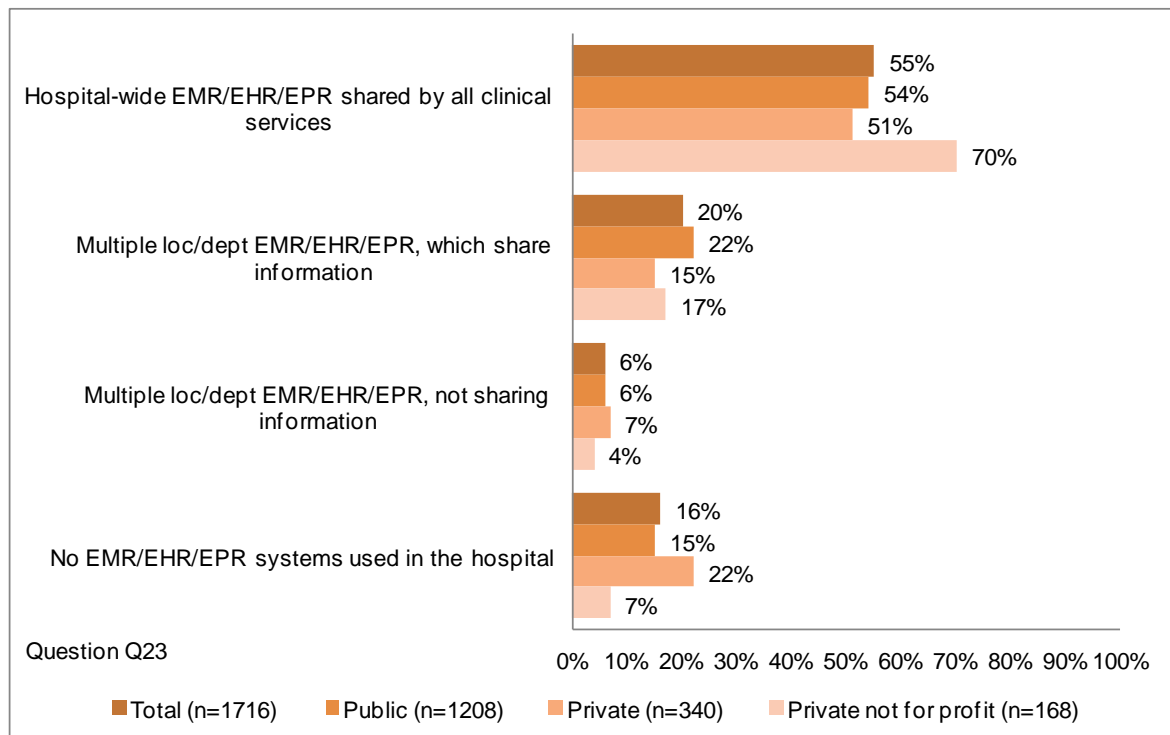
145 The comparison by hospital size shows a clear correlation between size and use of EMR/EHR/EPR. The bigger hospitals are, the more they tend to have EMR/EHR/EPR and the more they tend to share information. In fact, only 5% of hospitals with more than 750 beds said they had no EMR/EHR/EPR, 60% have a hospital-wide EMR/EHR/EPR shared by all clinical services and 28% have multiple location/department EMR/EHR/EPRs which share information. These figures were significantly lower when considering the smallest hospitals, at respectively 27%, 44% and 15%.

Figure 31: Type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) used by the hospital, results by size

Answer to Q23: "Which type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) does your hospital mainly use?"
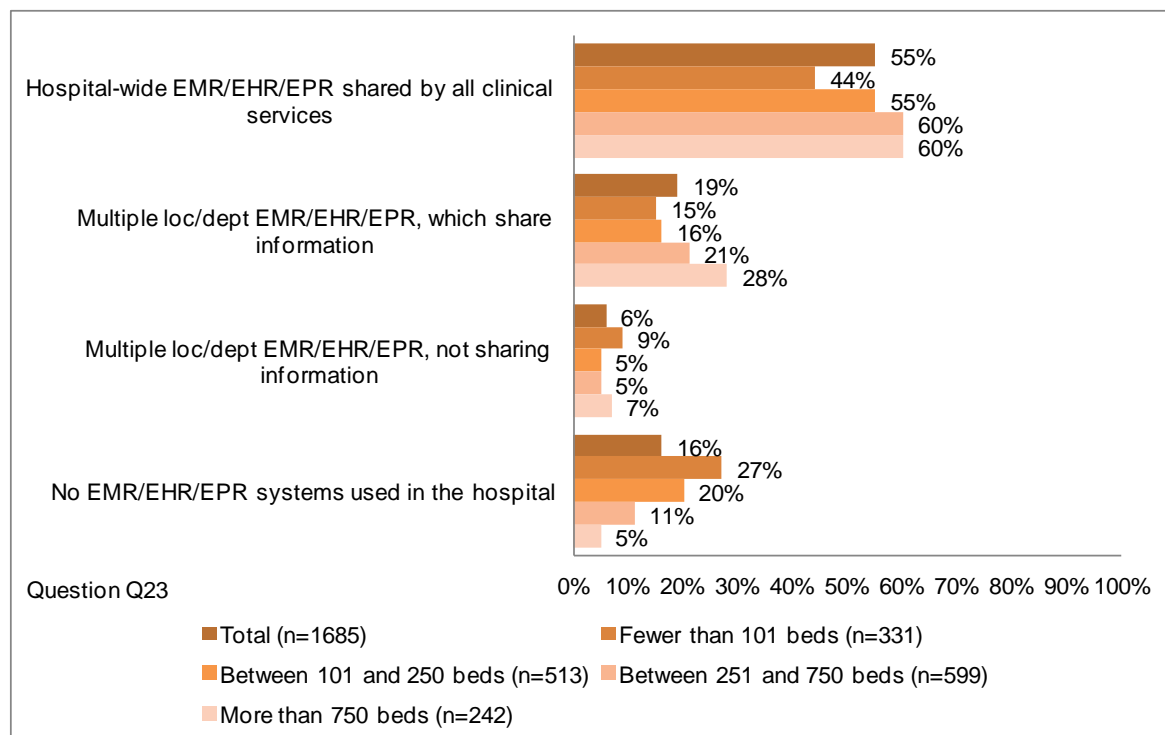
4.4.2   Patients' online access to personal data

146   According to Directive 95/46/EC[67], all EU citizens have the right to have access to their personal data, including their health data. The vast majority of hospitals (90%) still do not provide online access to their electronic patient records, as shown in the next figure. However, this is slightly less than in the previous survey (95%).

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[67]   European Parliament (1995), 'Directive 95/46/EC of the European Parliament and the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data', European Parliament.

Figure 32: Availability of online access to electronic records by patients, European level results

Answer to Q24: "Do patients have online access to their electronic patient records?"

Base: n = 1753
Question Q24

Legend:
- Yes, to everything
- Yes, but only to certain data (e.g. results and protocols)
- No
- Don't know

Pie chart values: 1%, 1%, 8%, 90%
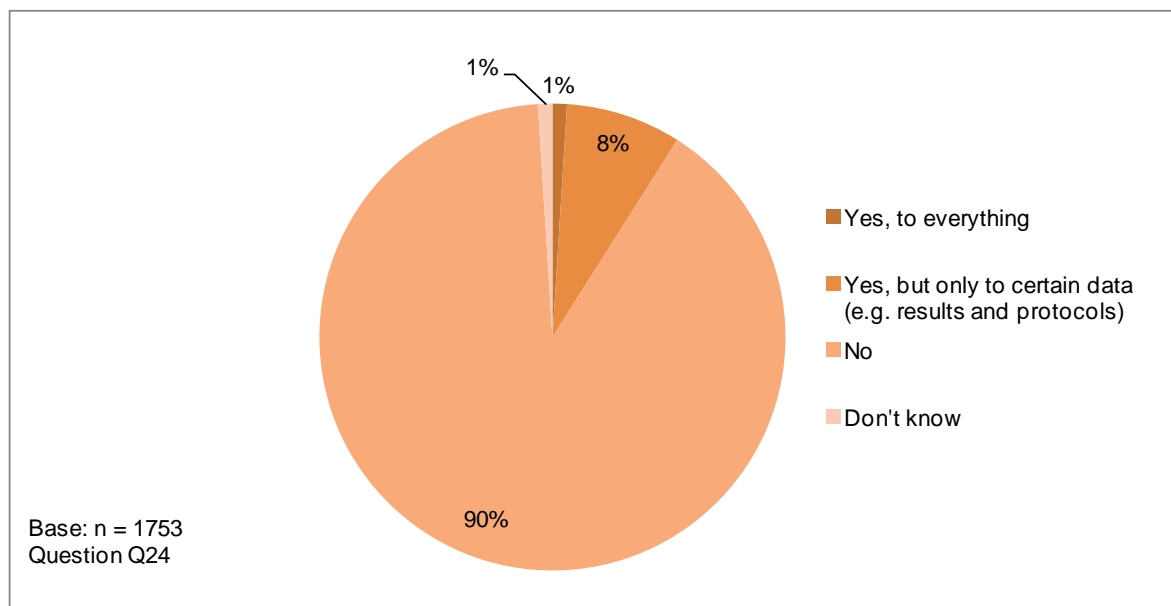
147 Hospitals in Denmark, Estonia and Malta — and to a lesser extent Italy and Spain — are more likely to grant patients online access to their health data. However, when they do so, they provide access to only a limited amount of data.

61

Figure 33: Availability of online access to electronic records by patients, Country-level results

Answer to Q24: "Do patients have online access to their electronic patient records?"

Country	Yes, to everything	Yes, but only to certain data	No
EU27+3	1%	8%	91%
EU27	1%	8%	91%
Austria		5%	95%
Belgium	2%	8%	90%
Bulgaria		8%	92%
Croatia			100%
Cyprus			100%
Czech republic			100%
Denmark	62%		38%
Estonia	75%		25%
Finland		4%	96%
France	2%	4%	93%
Germany			100%
Greece		4%	96%
Hungary	2%	7%	91%
Iceland			100%
Ireland		5%	95%
Italy	4%	23%	73%
Latvia		5%	95%
Lithuania		3%	97%
Luxembourg			100%
Malta		100%	
Netherlands		4%	96%
Norway	17%		83%
Poland		3%	97%
Portugal		5%	95%
Romania	2%	4%	94%
Slovakia			100%
Slovenia			100%
Spain	2%	19%	79%
Sweden		8%	92%
United Kingdom	1%		99%

Base: n= 1741
Question Q24

■ Yes, to everything   ■ Yes, but only to certain data (e.g. results and protocols)   ■ No

4.4.3   Picture Archiving and Communication System

148   A Picture Archiving and Communication System (PACS) is a combination of hardware and software which stores, retrieves, manages, shares (under DICOM format) and displays medical images such as ultrasounds, Magnetic Resonance Imagings (MRI), positron emission tomography, computed tomography, endoscopy, mammograms and radiography. A PACS replaces hard film copies with digital images. The usage of a PACS enables healthcare cost reductions (by avoiding duplicates and film purchase), as well as rapid and easy access to patients' data and history.

149   70% of surveyed European acute care hospitals have a PACS, which is a higher percentage than that reported in the previous survey (61%).

Figure 34: Availability of Picture Archiving and Communication System (PACS), European level results

Answer to Q25: "Does the hospital use a Picture Archiving and Communication System (PACS)?"

Base: n = 1753
Question Q25
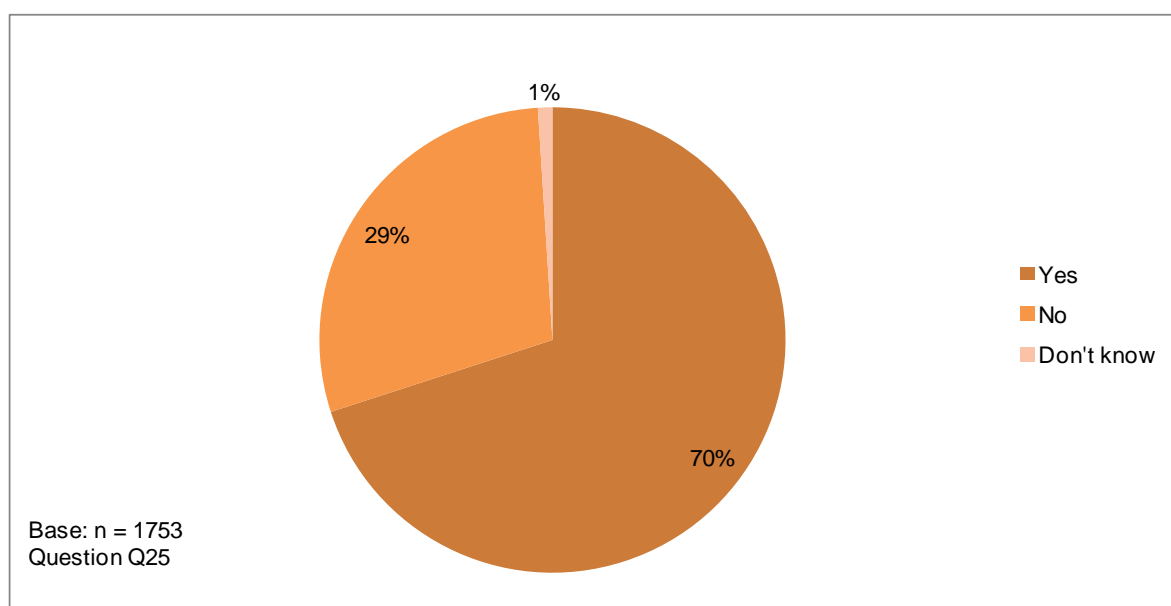
150   Forerunners in PACS usage are Austria, Czech Republic, Estonia, Finland, Iceland, Luxembourg, Malta and the UK: at least 95% of the hospitals in these countries use a PACS. In contrast, countries lagging behind include France and those located in Southern/Eastern/Central Europe (Bulgaria, Cyprus, Greece, Romania and Slovenia); here PACS usage does not exceed 50%.

Figure 35: Availability of Picture Archiving and Communication System (PACS), Country-level results

Answer to Q25: "Does the hospital use a Picture Archiving and Communication System (PACS)?"

Country	Yes	No
EU27+3	71%	29%
EU27	71%	29%
Austria	100%	
Belgium	90%	10%
Bulgaria	51%	49%
Croatia	91%	9%
Cyprus	42%	58%
Czech republic	95%	5%
Denmark	94%	6%
Estonia	100%	
Finland	96%	4%
France	46%	54%
Germany	77%	23%
Greece	32%	68%
Hungary	81%	19%
Iceland	100%	
Ireland	83%	17%
Italy	86%	14%
Latvia	78%	22%
Lithuania	69%	31%
Luxembourg	100%	
Malta	100%	
Netherlands	92%	8%
Norway	67%	33%
Poland	68%	32%
Portugal	83%	17%
Romania	23%	77%
Slovakia	79%	21%
Slovenia	50%	50%
Spain	93%	7%
Sweden	88%	12%
United Kingdom	97%	3%

Base: n = 1735
Question Q25

■ Yes ■ No

151 There is no significant difference between the surveyed hospitals according to their ownership status regarding the use of a Picture Archiving and Communication System. Hospitals from the public and the private sectors, as well as private not for profit hospitals, show very similar results, as 70% of public hospitals, 69% of private hospitals and 72% of private not for profit hospitals declared having a PACS.

152 However, there does appear to be a correlation in the use of PACS based on the size of hospitals. As shown in Figure 36 below, the bigger the establishments are, the more they rely on PACS. In fact, 86% of

hospitals with more than 750 beds declared using a PACS, while this was the case for only 56% of hospitals with less than 101 beds.

Figure 36: Availability of Picture Archiving and Communication System (PACS), results by size

Answer to Q25: "Does the hospital use a Picture Archiving and Communication System (PACS)?"
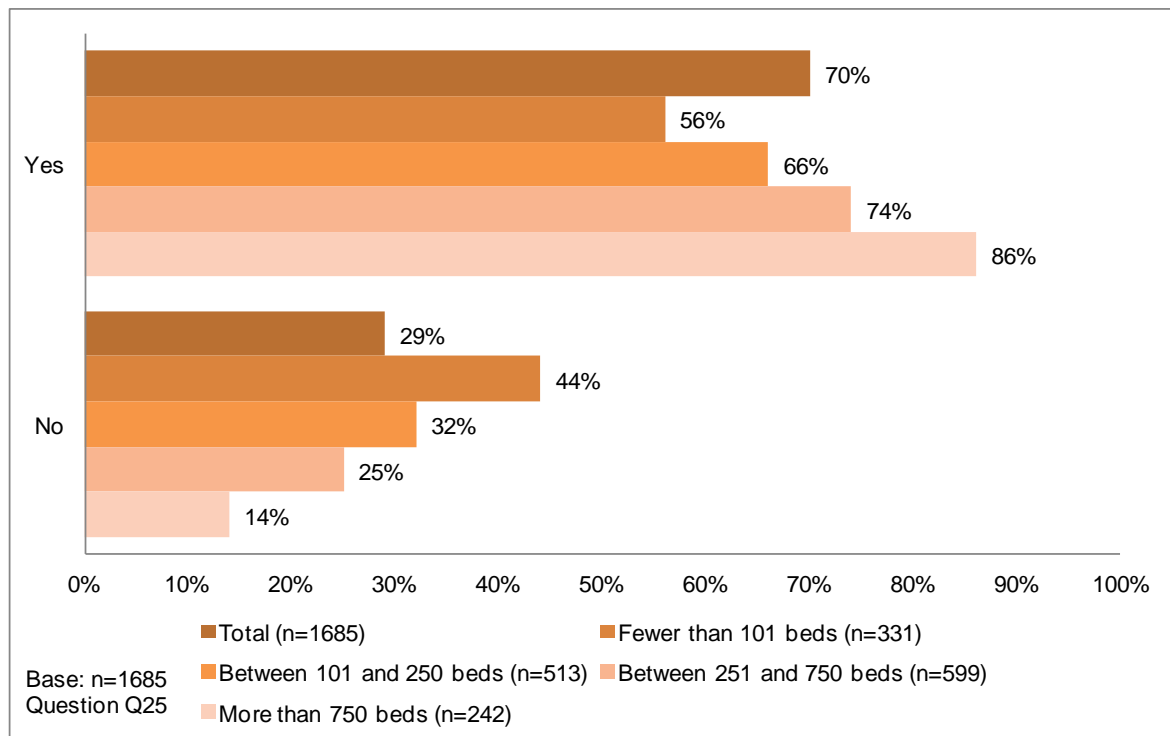
4.4.4   Integration of systems and applications

153   This section examines the computerised systems and applications implemented within European hospitals. As the results will show, the level of implementation of these services depends on the category of systems and applications in question.

154   At European level, computerised systems for billing management (79%) were by far the most widely integrated systems, easily outpacing the next most widely integrated service (ePrescribing at 43%). Tele-radiology, Discharge letters and Referral letters were relatively closely grouped with ePescribing, measuring 41%, 37% and 35% respectively.

Figure 37: Type of computerised systems integrated by the hospital, European level results

Answers to Q26: "Which of the following computerised systems has the hospital integrated?"

Billing management	79%
Referral letters	35%
Discharge letters	37%
Tele-radiology	41%
E-Prescribing	43%
Medical decision support	22%
Don't know	7%

Base = 1753
Question Q26
Multiple answers allowed
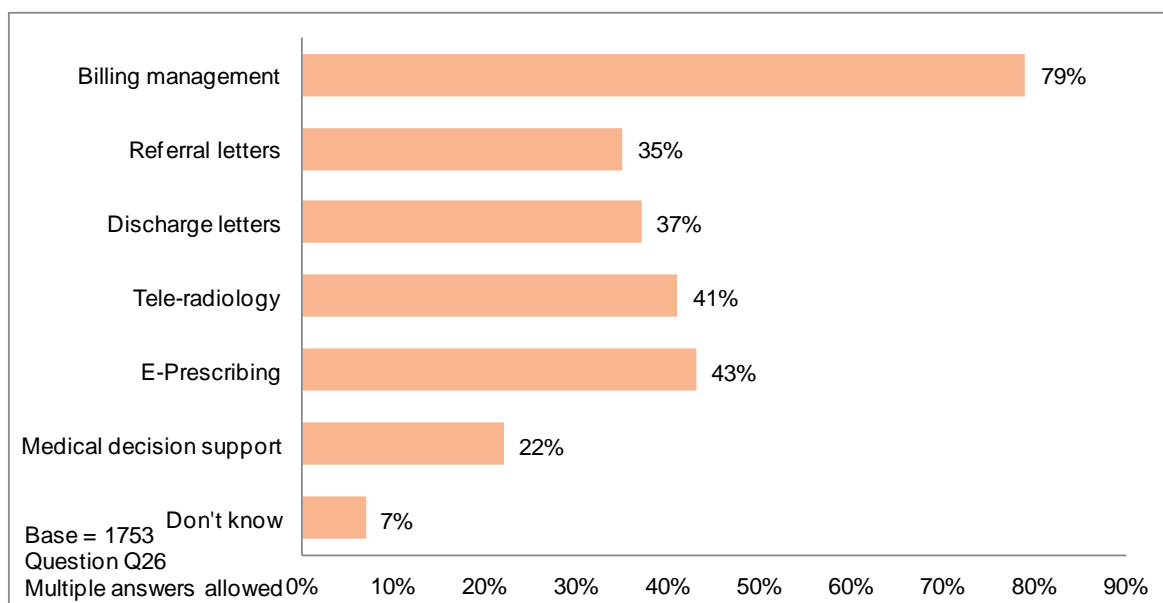
155 Regarding other computer-based systems and applications, Transmission of clinical test results led with 76%, closely followed by Appointment booking (70%) and Medical document management (63%). Tele-homecare/tele-monitoring scored the lowest at 9%. There was little variation of these results between 2010 and 2012. The most notable change was observed for electronic transmission of results of clinical tests, for which the score of 70% in 2010 rose to 76% in 2012. The figures below illustrate these findings.

Answers to Q27: "Does the hospital have the following computer-based system or applications…?"

Adverse health events reporting	41%
Transmission of clinical test results	76%
Service order placing	56%
Appointment booking	70%
Tele-homecare/ tele-monitoring	9%
Critical care information	43%
Medical document management	63%
Business intelligence information	40%
Don't know	7%

Base = 1753
Question Q27
Multiple answers allowed
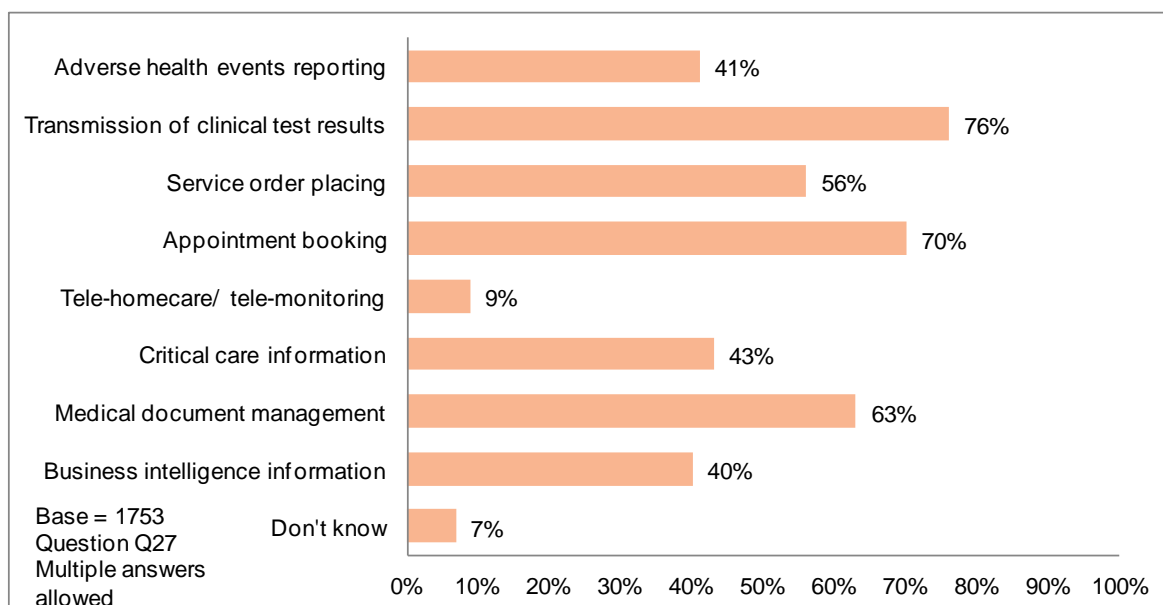
156 When comparing the level of implementation of computerised systems or applications at national level, most of the Nordic countries (Denmark, Estonia, Finland, Sweden) as well as the small/middle-sized countries of Western Europe (Austria, Belgium, Luxembourg and the Netherlands) are the most advanced, whereas Eastern European countries (Bulgaria, Latvia, Lithuania, Poland, Romania), Cyprus and Slovenia still remain below the European average. The biggest countries of Western Europe (France, Germany, Italy, Portugal, Spain, the UK), Central European countries (Croatia, Czech Republic, Hungary, Slovakia) together with Belgium, Greece, Iceland, Ireland, Malta and Norway are in line with the European average.

Figure 38: Type of computerised systems integrated by the hospital, Country-level results

Answers to Q26: "Which of the following computerised systems has the hospital integrated?"

Base: n=1753 Question Q26 Multiple answers allowed	Billing management	Referral letters	Discharge letters	Tele-radiology	E-Prescribing	Medical decision support
EU27+3	79%	35%	37%	41%	43%	22%
EU27	79%	34%	36%	41%	43%	22%
Austria	93%	42%	86%	84%	16%	26%
Belgium	94%	56%	74%	44%	46%	22%
Bulgaria	48%	27%	16%	11%	21%	6%
Croatia	82%	64%	27%	55%	27%	36%
Cyprus	77%	31%	15%	23%	8%	8%
Czech republic	65%	35%	28%	35%	45%	35%
Denmark	81%	94%	100%	44%	94%	56%
Estonia	92%	83%	75%	58%	100%	42%
Finland	96%	85%	73%	50%	81%	27%
France	95%	29%	18%	35%	39%	24%
EU27+3	79%	35%	37%	41%	43%	22%
Germany	90%	22%	34%	45%	9%	24%
Greece	90%	71%	76%	15%	94%	7%
Hungary	86%	56%	60%	49%	95%	23%
Iceland	78%	78%	67%	44%	67%	33%
Ireland	87%	30%	35%	43%	9%	9%
Italy	85%	35%	42%	51%	51%	25%
Latvia	37%	32%	26%	26%	5%	11%
Lithuania	59%	28%	22%	34%	12%	22%
Luxembourg	100%	33%	0%	67%	67%	67%
Malta	50%	0%	100%	50%	0%	0%
EU27+3	79%	35%	37%	41%	43%	22%
Netherlands	81%	65%	85%	35%	69%	19%
Norway	67%	67%	50%	33%	33%	0%
Poland	50%	21%	18%	39%	17%	12%
Portugal	83%	15%	20%	32%	93%	15%
Romania	62%	16%	29%	7%	84%	22%
Slovakia	79%	15%	18%	42%	21%	9%
Slovenia	83%	0%	0%	0%	0%	17%
Spain	86%	23%	22%	56%	67%	35%
Sweden	96%	69%	81%	73%	85%	27%
United Kingdom	29%	71%	65%	71%	20%	9%

Answers to Q27: "Does the hospital have the following computer-based system or applications…?"

Base: n=1753 Question Q27 Multiple answers allowed	Adverse health events reporting	Transmission of clinical test results	Service order placing	Appointment booking	Tele-homecare/ tele-monitoring	Critical care information	Medical document management	Business intelligence information
EU27+3	41%	76%	56%	70%	9%	43%	63%	40%
EU27	42%	76%	56%	70%	9%	43%	63%	39%
Austria	42%	91%	77%	95%	7%	84%	91%	60%
Belgium	54%	90%	34%	90%	10%	78%	76%	52%
Bulgaria	10%	45%	31%	21%		18%	48%	53%
Croatia	18%	73%	36%	36%	18%	36%	55%	45%
Cyprus	23%	54%	23%	31%		15%	31%	23%
Czech republic	48%	95%	68%	28%	2%	52%	85%	45%
Denmark	75%	94%	75%	75%	19%	62%	88%	50%
Estonia	25%	83%	83%	92%	17%	67%	100%	33%
Finland	88%	96%	81%	88%	19%	69%	100%	73%
France	72%	79%	38%	66%	13%	44%	71%	24%
Germany	38%	82%	63%	80%	3%	52%	74%	44%
Greece	12%	78%	68%	78%	1%	31%	53%	53%
Hungary	9%	60%	58%	56%		26%	95%	23%
Iceland	44%	78%	78%	89%	11%	11%	78%	44%
Ireland	39%	83%	57%	87%		30%	26%	57%
Italy	40%	79%	78%	88%	17%	62%	53%	42%
Latvia	5%	47%	26%	32%		16%	37%	32%
Lithuania	12%	41%	25%	41%		9%	22%	19%
Luxembourg	67%	100%	100%	100%		67%	100%	33%
Malta		100%	100%	100%				
Netherlands	73%	81%	65%	96%	35%	85%	81%	92%
Norway	17%	83%	83%	17%	17%	33%	67%	50%
Poland	13%	56%	45%	56%	3%	13%	38%	34%
Portugal	32%	76%	68%	76%	5%	29%	63%	32%
Romania	9%	53%	38%	27%	1%	19%	48%	7%
Slovakia	15%	100%	73%	36%		48%	82%	36%
Slovenia	33%	83%	33%	67%			33%	33%
Spain	42%	86%	69%	97%	22%	60%	82%	52%
Sweden	69%	88%	73%	88%	8%	50%	69%	58%
United Kingdom	84%	93%	67%	91%	22%	30%	32%	61%

4.5   Block D. Health Information Exchange

157   This section covers questions Q28 to Q34 related to the exchange of health information. This section has been divided into two subjects: exchange of information and interoperability of systems.

Key findings of this survey block:

- More than half of hospitals exchange clinical care information electronically.
- The proportion of hospitals carrying out electronic exchange of information with other healthcare providers also stands slightly above 50% for exchange of laboratory results and radiology images and reports, but it falls below 30% for medication lists.
- Information is mostly exchanged with a hospital or hospitals outside their own hospital system, with external general practitioners and with external specialists in decreasing order of importance. Information is rarely exchanged with providers of other countries, either in the EU or outside.
- A group of Nordic countries and small/medium-sized countries of Central and Western Europe (Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, Latvia, Iceland, Luxembourg, Malta, the Netherlands and Sweden) are the countries that electronically exchange most medication lists information with other healthcare providers. A group of predominantly Eastern Europe countries (Bulgaria, Greece, Lithuania, Poland, Romania, Slovakia and Slovenia) are behind in this activity.
- On average, private not for profit hospitals are more advanced than the other types of hospitals in the electronic exchange of clinical care information. Public hospitals have higher results than private hospitals, except for the electronic exchange of laboratory results.
- There is a clear positive correlation between hospital size and the extent to which hospitals electronically exchange information about patients, whatever the type of information.
- 46% of the surveyed European hospitals do not experience any interoperability problems.
- When a hospital experiences interoperability problems, it is more at the technical level (36% of the respondents) than at the semantic or organisational level (21% and 24% of respondents respectively).
- Large hospitals and public hospitals are the categories of hospitals most likely to encounter interoperability problems.
- When hospitals use EPR systems which don't share information, 59% of the respondents think it is valuable to receive additional training courses in order to improve technical skills related to hospital system interoperability.

4.5.1   Exchange of clinical care information with other providers

158   Several studies have shown the added value of eHealth and more particularly of electronic exchange of health information. A 2009 study on eHealth[68] illustrates among its results that eHealth has helped to increase clinical staff productivity and to reduce inappropriate referrals, prescription errors, duplicate laboratory/chemistry tests, film costs, and the number of lost images and repeat imaging tests.

159   Despite the recognised importance of electronic exchange of health information, almost half of the respondents (43%) said they do not exchange any clinical care information electronically.

160   This percentage has decreased with respect to the 2010 survey, in which 54% of the respondents did not exchange any such information electronically. Information is mostly exchanged with a hospital or hospitals outside their own hospital system (39% of answers vs. 33% in the previous survey), external general practitioners (36% vs. 28% in 2010) and external specialists (33% vs. 28% in 2010). Information is seldom exchanged with providers in other countries, which remains comparable to 2010 results.

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[68] eHealth for a Healthier Europe!, Gartner, 2009

Figure 39: Exchange of clinical care information about patients, European level results

Answer to Q28: "Does your hospital exchange electronically clinical care information about patients (for instance, clinical history or results from medical tests) with any of the following providers?"

Base: n=1685
Question Q28
Multiple answers allowed

- Hospital(s) outside own hospital system — 39%
- External general practitioners — 36%
- External specialists — 33%
- Health care providers in other EU countries — 4%
- Health care providers outside the EU countries — 3%
- Other — 3%
- None — 43%
- Don't know — 4%
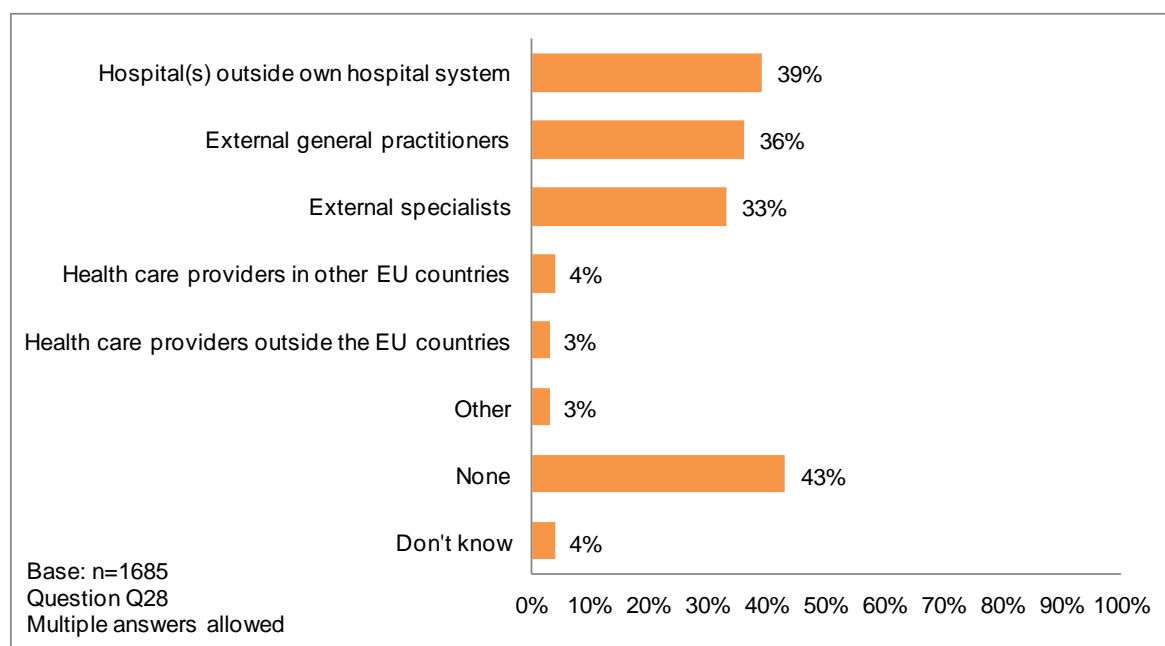
161   All of the surveyed hospitals in Denmark and Malta exchange clinical care information electronically, whereas more than 70% of surveyed hospitals in Greece, Lithuania, Poland, Romania Slovakia and Slovenia do not exchange any information electronically with other healthcare providers. The United Kingdom, Belgium, the Netherlands, Spain and Austria together with a group of Nordic countries (Estonia, Sweden, Denmark and Iceland) exchange a significant amount of clinical information electronically with external healthcare providers *("External general practitioners", "External specialists"* or *"Other hospitals")*.

Figure 40 Exchange of clinical care information about patients, Country-level results

Answer to Q28: "Does your hospital exchange electronically clinical care information about patients (for instance, clinical history or results from medical tests) with any of the following providers?"

Base: n = 1753 Question Q28 Multiple answers allowed	Hospital(s) outside own hospital system	External general practitioners	External specialists	Health care providers in other EU countries	Health care providers outside the EU countries	Other	None
EU27+3	39%	36%	33%	4%	3%	3%	43%
EU27	39%	36%	33%	4%	2%	3%	43%
Austria	77%	84%	84%	5%	2%	2%	12%
Belgium	68%	90%	80%	14%	6%	2%	8%
Bulgaria	16%	15%	18%	5%	3%	11%	52%
Croatia	55%	27%	18%	18%			27%
Cyprus	8%	8%	15%	23%	15%		54%
Czech republic	52%	35%	30%				35%
Denmark	81%	94%	81%	6%	6%		
Estonia	75%	75%	83%	8%			8%
Finland	81%	42%	42%			4%	19%
France	44%	41%	41%	2%	1%	1%	39%
Germany	33%	36%	41%	3%	3%	2%	44%
Greece	13%	4%	6%	6%	3%	10%	76%
Hungary	21%	33%	12%		2%		60%
Iceland	78%	67%	56%	11%	11%		11%
Ireland	39%	65%	35%				22%
Italy	39%	34%	17%	4%	3%	2%	43%
Latvia	42%	11%	11%				26%
Lithuania	19%	12%	12%				75%
Luxembourg		33%	33%				33%
Malta	50%	50%	50%				
Netherlands	62%	81%	58%	4%		8%	12%
Norway	33%	50%	50%				50%
Poland	17%	6%	15%	3%	1%	3%	71%
Portugal	49%	24%	22%	10%	5%	10%	32%
Romania	20%	13%	13%	5%	2%	4%	71%
Slovakia	12%	15%	15%	3%	3%		76%
Slovenia							83%
Spain	53%	43%	41%	8%	6%	8%	27%
Sweden	73%	46%	50%	8%	4%	4%	15%
United Kingdom	61%	68%	49%	4%		1%	23%

162 As for ownership status, the most significant result is that private not for profit hospitals are more advanced than the other types of hospitals in the electronic exchange of clinical care information. On average public hospitals tend to exchange more information with *"Hospital(s) outside their own hospital system"* and with *"External general practitioners"*. However, this tendency is reversed when it comes to electronic exchanges of clinical care information with external specialists, where 34% of private hospitals exchange such information as opposed to 30% of public ones.

Figure 41: Exchange of clinical care information about patients, results by ownership

Answer to Q28: "Does your hospital exchange electronically clinical care information about patients (for instance, clinical history or results from medical tests) with any of the following providers?"
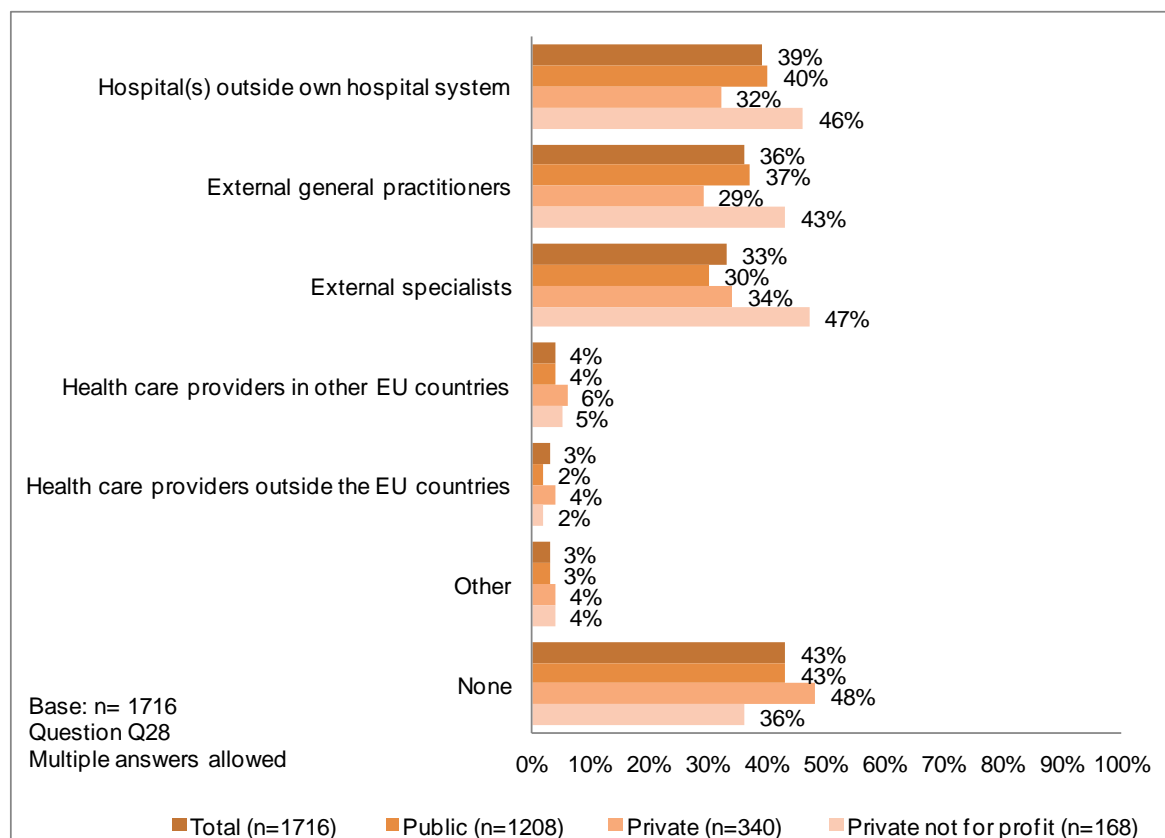
163 The electronic information exchange shares by hospital size follow a regular distribution path between exchange of information with hospital(s) outside their own hospital system, external general practitioners and external specialists. For these categories a clear positive correlation between the size of the hospital and the amount of information exchanged can be identified. In line with this result, the correlation is still present but reversed for the "none" category. The electronic exchange of information with providers in EU and non-EU countries accounted for the lowest scores in all hospital size categories. Information exchange scores for very large hospitals recorded the highest percentage gap with the other categories.

Figure 42: Exchange of clinical care information about patients, results by size

Answer to Q28: "Does your hospital exchange electronically clinical care information about patients (for instance, clinical history or results from medical tests) with any of the following providers?"

Base: n=1685
Question Q28
Multiple answers allowed

- Total (n=1685)
- Fewer than 101 beds (n=331)
- Between 101 and 250 beds (n=513)
- Between 251 and 750 beds (n=599)
- More than 750 beds (n=242)
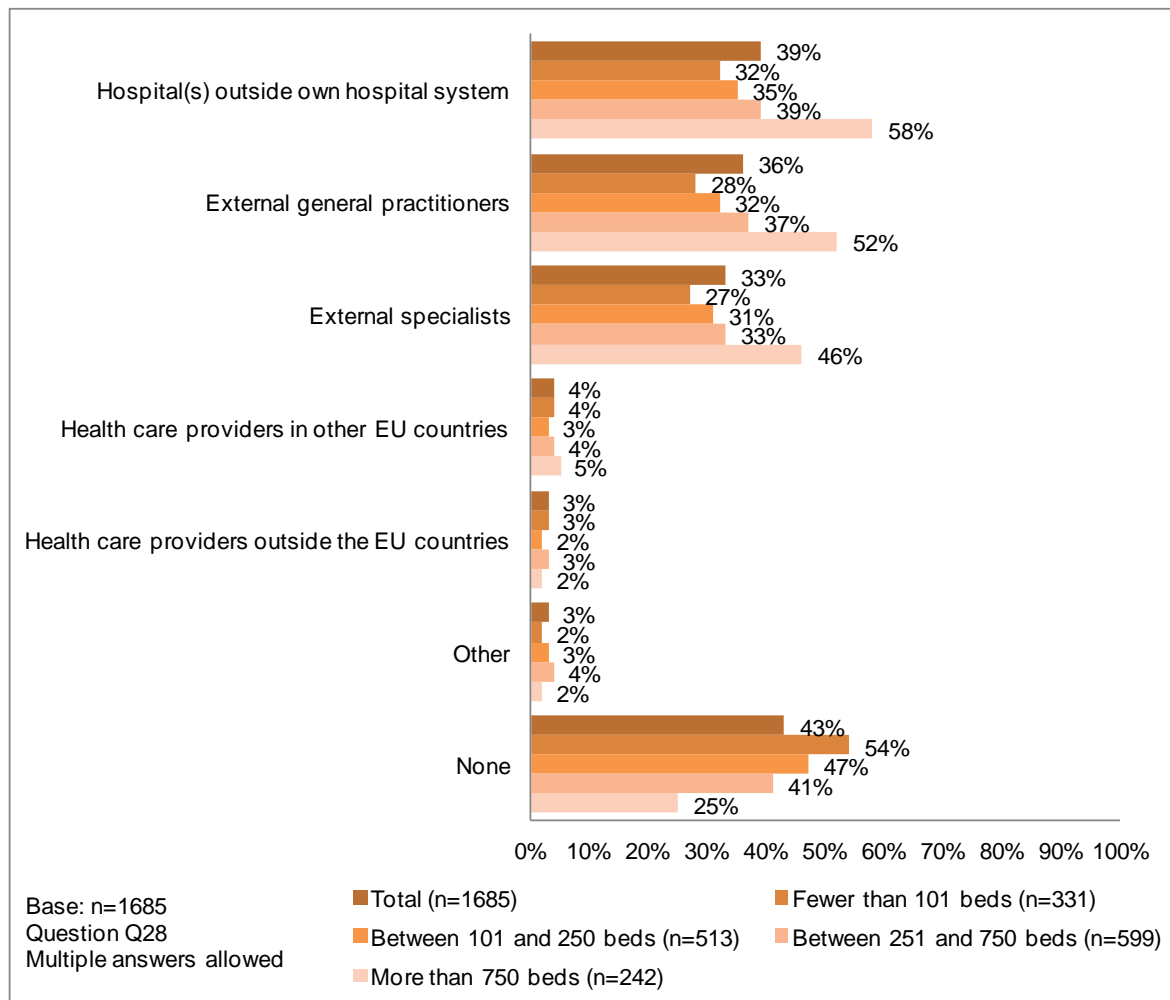
4.5.2 Electronic exchange of laboratory results information

164 Q29 presents the 2012-2013 results on the electronic exchange of laboratory results information. While 47% of European hospitals do not exchange this type of information electronically, this nevertheless represents a 10% improvement compared to 2010 (57%). The electronic exchange of such information mainly occurs with hospitals outside the respondent's hospital system (35%), external general practitioners (33%), and external specialists (27%). These results are slightly higher than the 2010 results. At European level, less than 3% of respondents exchange laboratory results electronically with healthcare professionals situated in other EU countries or in countries outside the EU.

Figure 43: Electronic exchange of laboratory results information, European level results

Answer to Q29: "Does your hospital exchange electronically laboratory results information about patients with any of the following providers?"
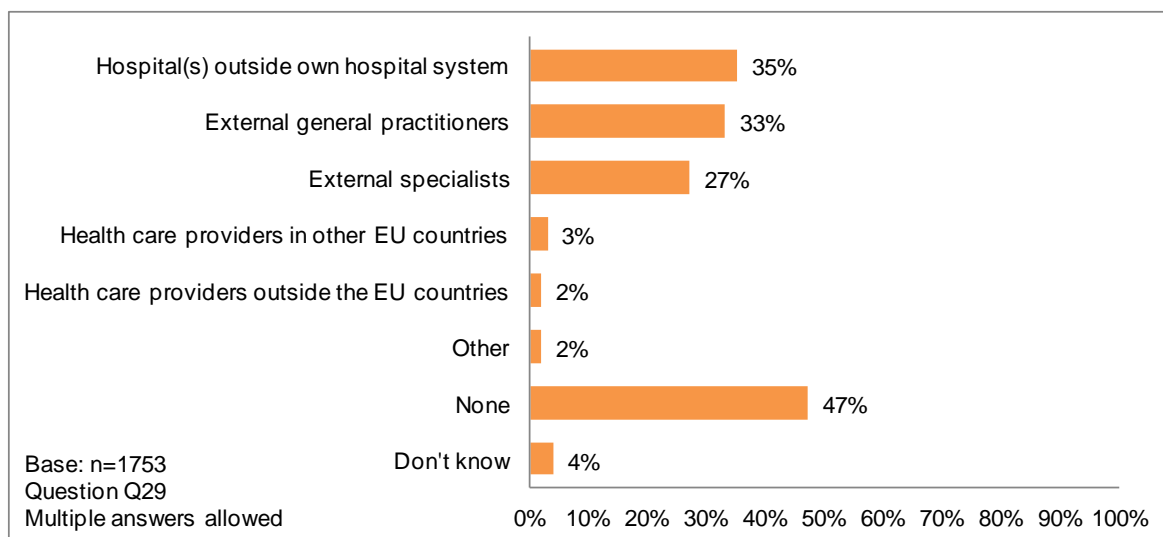
165 The electronic exchange of laboratory results tends to be higher in small/medium-sized countries (Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Iceland, Malta and the Netherlands) together with Finland and Sweden. These countries also exchange a lot of information electronically with external healthcare providers. On the other hand, Greece, Romania, Poland and Lithuania still lag behind: less than 30% of the hospitals in these countries share this type of information electronically. Electronic exchange of information with healthcare providers in other countries in or outside the EU is not well developed, with only Cyprus standing at a significant level, with respectively 38% and 23% of hospitals there carrying out such exchanges with EU and non-EU countries.

Figure 44: Electronic exchange of laboratory results information, European level results

Answer to Q29: "Does your hospital exchange electronically laboratory results information about patients with any of the following providers?"

Base = 1753 Question Q29 Multiple answers allowed	Hospital(s) outside own hospital system	External general practitioners	External specialists	Health care providers in other EU countries	Health care providers outside the EU countries	Other	None
EU27+3	35%	33%	27%	3%	2%	2%	47%
EU27	35%	33%	27%	3%	2%	2%	47%
Austria	63%	56%	60%	2%	2%		16%
Belgium	70%	86%	76%	14%	6%		8%
Bulgaria	11%	11%	13%	3%	2%	6%	69%
Croatia	36%	45%	36%	9%		9%	18%
Cyprus	31%	38%	38%	38%	23%	8%	38%
Czech republic	55%	68%	52%				15%
Denmark	62%	75%	62%				19%
Estonia	58%	92%	50%	8%			8%
Finland	73%	38%	27%			4%	23%
France	42%	34%	33%	2%	1%		42%
Germany	22%	21%	24%				60%
Greece	12%	6%	7%	7%	6%	6%	78%
Hungary	21%	56%	5%				37%
Iceland	67%	67%	67%	11%	11%		22%
Ireland	30%	57%	35%				30%
Italy	38%	31%	13%	3%	3%	3%	45%
Latvia	26%	16%	11%	5%			42%
Lithuania	6%	6%	6%				88%
Luxembourg		67%	67%				33%
Malta	50%	50%	50%				
Netherlands	65%	73%	42%	4%		8%	15%
Norway	50%	67%	50%				33%
Poland	15%	10%	11%	2%	1%	1%	76%
Portugal	34%	22%	17%	5%	5%	2%	51%
Romania	18%	14%	14%	5%	2%	1%	72%
Slovakia	24%	42%	39%	6%	6%		45%
Slovenia	33%		17%				50%
Spain	41%	38%	33%	6%	5%	8%	40%
Sweden	69%	65%	58%			4%	4%
United Kingdom	62%	49%	41%				26%

166 Private not for profit hospitals tend to have higher electronic exchange scores than other types of hospital. Conversely, the scores for no laboratory results exchange are reversed between the two categories. Only small numbers of hospitals across all size categories exchange results electronically with other providers in the EU or outside the EU.

Figure 45: Exchange of laboratory results information, results by ownership

Answer to Q29: "Does your hospital exchange electronically laboratory results information about patients with any of the following providers?"
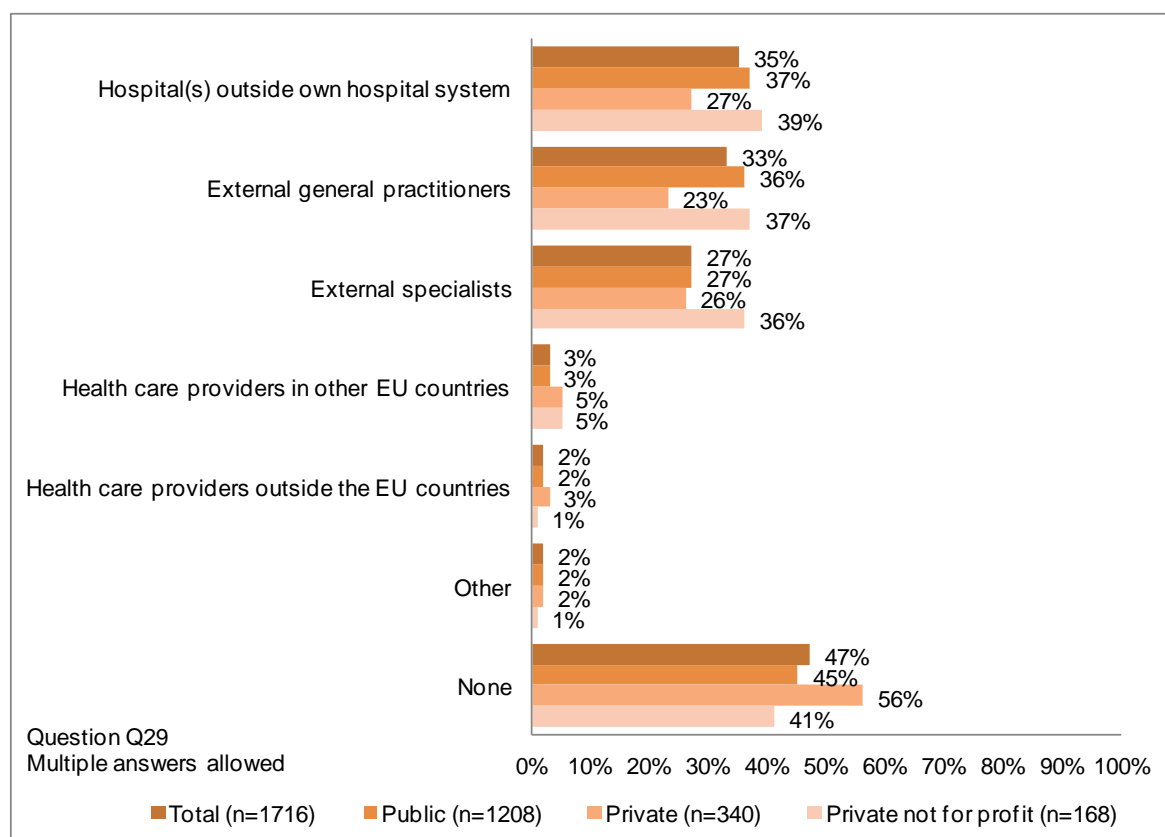
167 The comparison of results by hospital size reveals a positive correlation: the bigger hospitals are, the more they tend to exchange laboratory results electronically with other healthcare providers. Indeed, 55% of hospitals with more than 750 beds exchange lab results electronically with other hospitals. This positive correlation can also be seen in the electronic exchange of results with external general practitioners and external specialists. While the absence of any electronic exchange of laboratory results is the most frequent situation for smaller hospitals, cross-border electronic exchanges of lab results remain extremely limited regardless of hospital size.

Figure 46: Exchange of laboratory results information, results by size

Answer to Q29: "Does your hospital exchange electronically laboratory results information about patients with any of the following providers?"

Question Q29
Multiple answers allowed

- ■ Total (n=1685)
- ■ Between 101 and 250 beds (n=513)
- ■ More than 750 beds (n=242)
- ■ Fewer than 101 beds (n=331)
- ■ Between 251 and 750 beds (n=599)
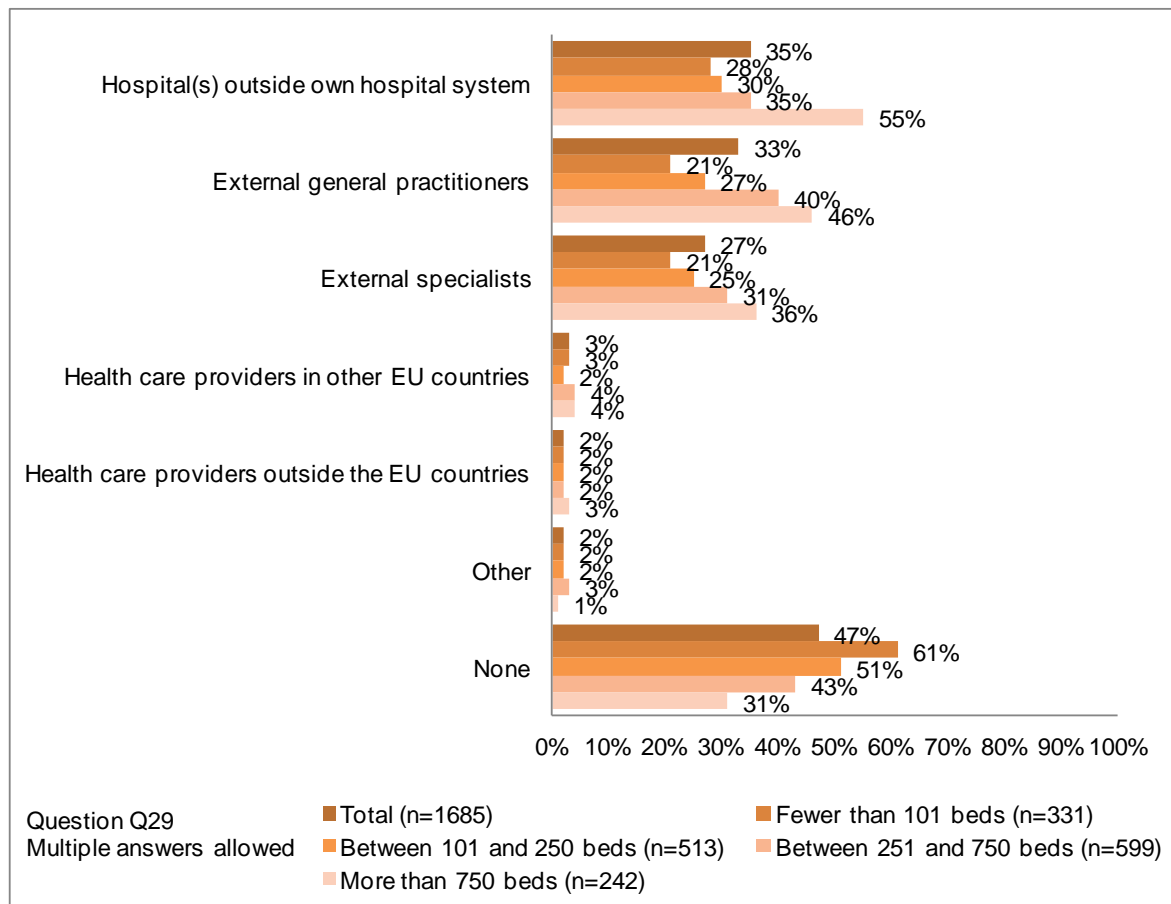
4.5.3 Exchange of medication lists information

168 Electronic exchange of medication lists information mostly concerns hospitals outside the same hospital system, external general practitioners and to a lesser extent external specialists (respectively 17%, 16% and 12% of the respondents), which is comparable to 2010 survey results. Almost none of the European hospitals electronically exchange a substantial part of medication lists information with providers in other countries either inside or outside of the EU. Cyprus constitutes an outlier (respectively 23% and 8%) in this regard.

Figure 47: Exchange of medication lists information, European level results

Answer to Q30: "Does your hospital exchange electronically medication lists information about patients with any of the following providers?"
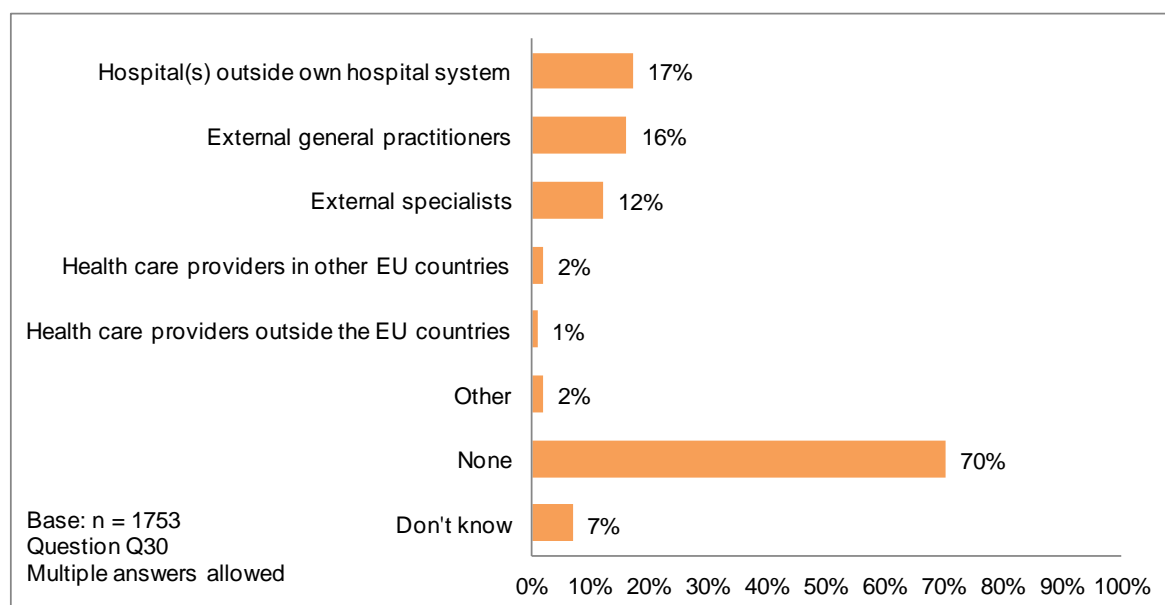
169 On average, Denmark, Iceland, Netherlands and Sweden are the countries that electronically exchange most medication lists information with other healthcare providers. By contrast, more than 80% of the hospitals in a large group of eastern countries (Czech Republic, Hungary, Lithuania, Poland, Slovenia and Slovakia) as well as in Norway and Germany do not do so. It has to be noted that such exchanges of information are not well developed between hospitals of different countries, with only smaller countries like Cyprus and Iceland standing at more than 10%.

Figure 48: Exchange of medication lists information, European level results

Answer to Q30: "Does your hospital exchange electronically medication lists information about patients with any of the following providers?"

Base: n = 1753 Question Q30 Multiple answers allowed	Hospital(s) outside own hospital system	External general practitioners	External specialists	Health care providers in other EU countries	Health care providers outside the EU countries	Other	None
EU27+3	17%	16%	12%	2%	1%	2%	70%
EU27	17%	16%	12%	2%	1%	2%	70%
Austria	26%	30%	30%	2%	2%		63%
Belgium	34%	30%	26%	6%	4%		56%
Bulgaria	10%	3%	3%	3%	2%	3%	74%
Croatia		9%	9%	9%			36%
Cyprus	23%	23%	23%	23%	8%		54%
Czech republic	5%	2%	2%			2%	88%
Denmark	75%	88%	75%	6%	6%		6%
Estonia	33%	33%	33%	8%			58%
Finland	46%	27%	23%			15%	42%
France	13%	11%	11%	2%	1%		76%
Germany	10%	9%	11%				82%
Greece	7%	3%	3%	3%	1%	12%	74%
Hungary	5%	9%	2%				86%
Iceland	56%	56%	44%	11%	11%		33%
Ireland	4%	13%	4%				78%
Italy	24%	22%	9%	2%	1%	1%	62%
Latvia							32%
Lithuania	3%	3%	3%				84%
Luxembourg		33%	33%				67%
Malta	50%	50%	50%				50%
Netherlands	42%	65%	38%	8%		8%	19%
Norway		17%					83%
Poland	2%	1%	2%	1%	1%	1%	94%
Portugal	34%	15%	7%	5%	2%	2%	56%
Romania	16%	13%	11%	5%	2%	2%	74%
Slovakia	12%	9%	12%	3%	3%		85%
Slovenia	17%	17%	17%				83%
Spain	22%	22%	18%	3%	2%	6%	61%
Sweden	58%	50%	46%				23%
United Kingdom	13%	39%	3%				51%

4.5.4 Electronic exchange of radiology images and reports

170 The next question relates to the electronic exchange of radiology images and reports. Even though the percentage of hospitals exchanging such information has increased since 2010, 44% of the surveyed hospitals still do not exchange any radiology images and reports. For the remaining hospitals, the electronic exchange mainly occurs with hospitals outside the same hospital system (46%, representing an increase over 2010). Electronic exchanges with external general practitioners and specialists are less important (respectively 26% and 32% of the surveyed hospitals) and remain stable compared to 2010 results.

Figure 49: Exchange of radiology images and reports, European level results

Answer to Q31: "Does your hospital exchange electronically radiology images and reports about patients with any of the following providers?"
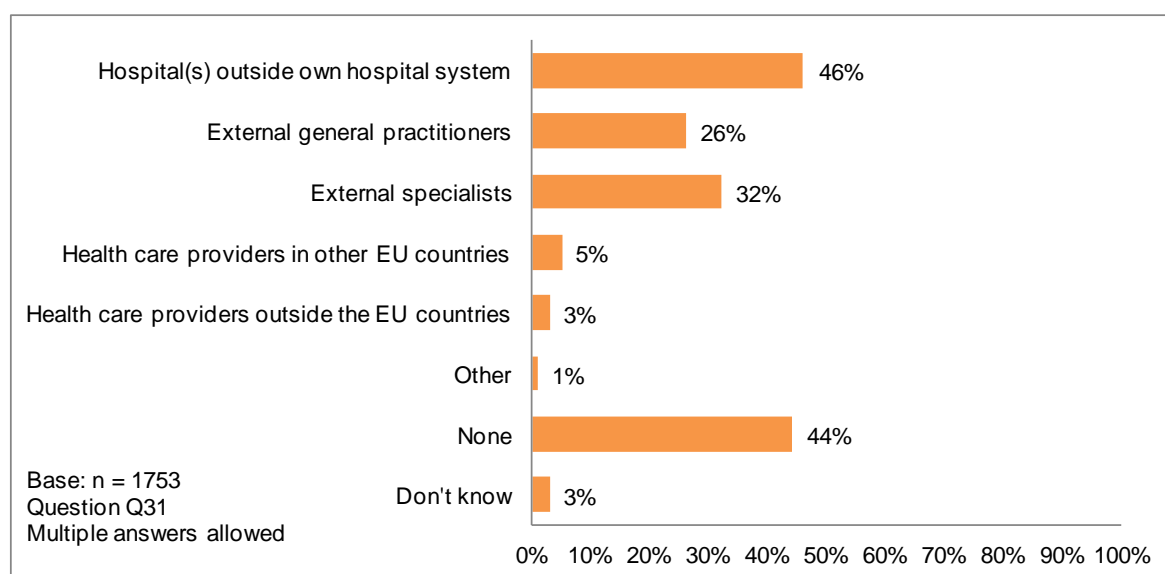
171 The comparison at country level shows that more than 80% of hospitals in Austria, Czech Republic, Denmark, Estonia, Finland, Latvia, Luxembourg, Malta and Sweden electronically exchange radiology reports and images with other hospitals. More than half of the hospitals in Cyprus electronically exchange such information with other providers in the EU and 31% do so with providers in countries outside the EU. However, the Cyprus results have to be seen with caution as the number of participating hospitals in Cyprus is low (n=13). On the other side of the spectrum, a number of countries, namely Bulgaria, Greece, Romania and Slovenia are falling behind with more than 70% of their hospitals not exchanging this type of information electronically.

Figure 50: Exchange of radiology images and reports, Country-level results

Answer to Q31: "Does your hospital exchange electronically radiology images and reports about patients with any of the following providers?"

Base: n=1753 Question Q31 Multiple answers allowed	Hospital(s) outside own hospital system	External general practitioners	External specialists	Health care providers in other EU countries	Health care providers outside the EU countries	Other	None
EU27+3	46%	27%	32%	5%	3%	1%	44%
EU27	46%	27%	32%	5%	3%	1%	44%
Austria	86%	47%	70%	7%	5%		9%
Belgium	64%	64%	66%	14%	12%		24%
Bulgaria	16%	10%	18%	8%	8%		73%
Croatia	36%		18%				45%
Cyprus	46%	46%	46%	54%	31%		31%
Czech republic	85%	52%	52%	12%			15%
Denmark	75%	38%	38%	6%	6%		6%
Estonia	100%	92%	100%	17%	8%		
Finland	81%	50%	46%			4%	15%
France	50%	22%	30%	2%	1%		43%
Germany	50%	29%	40%	4%	3%		38%
Greece	12%	9%	12%	9%	7%	3%	76%
Hungary	30%	12%	19%		2%		60%
Iceland	67%	44%	56%	11%	11%		33%
Ireland	48%	43%	39%	4%	4%		35%
Italy	51%	24%	15%	3%	2%	3%	40%
Latvia	53%	32%	42%			5%	
Lithuania	25%	9%	9%				66%
Luxembourg	100%	33%	67%			33%	
Malta	50%	50%	50%			50%	
Netherlands	54%	50%	50%	4%		4%	23%
Norway	67%	50%	50%				33%
Poland	24%	2%	23%	3%	1%	1%	63%
Portugal	37%	17%	29%	5%	2%	2%	44%
Romania	15%	8%	12%	4%	2%		79%
Slovakia	48%	21%	30%	12%	3%		48%
Slovenia	17%						83%
Spain	50%	44%	48%	5%	5%	6%	35%
Sweden	73%	46%	58%	15%	15%		15%
United Kingdom	62%	46%	38%			1%	35%

172 Comparisons between private and public hospitals show that the latter are in general more advanced with regard to the electronic exchange of radiology images and reports. 42% of public hospitals said they do not carry out such exchanges, against 51% of private hospitals. The shares for "Private not for profit hospitals" are comparable to those of public hospitals for all provider categories.

Figure 51: Exchange of radiology images and reports, results by ownership

Answer to Q31: "Does your hospital exchange electronically radiology images and reports about patients with any of the following providers?"

Hospital(s) outside own hospital system
- 46%
- 50%
- 33%
- 46%

External general practitioners
- 26%
- 27%
- 21%
- 34%

External specialists
- 32%
- 31%
- 30%
- 43%

Health care providers in other EU countries
- 5%
- 4%
- 6%
- 7%

Health care providers outside the EU countries
- 3%
- 3%
- 4%
- 4%

Other
- 1%
- 1%
- 2%
- 1%

None
- 44%
- 42%
- 51%
- 42%

Question Q31
Multiple answers allowed

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Total (n=1716)   ■ Public (n=1208)   ■ Private (n=340)   ■ Private not for profit (n=168)
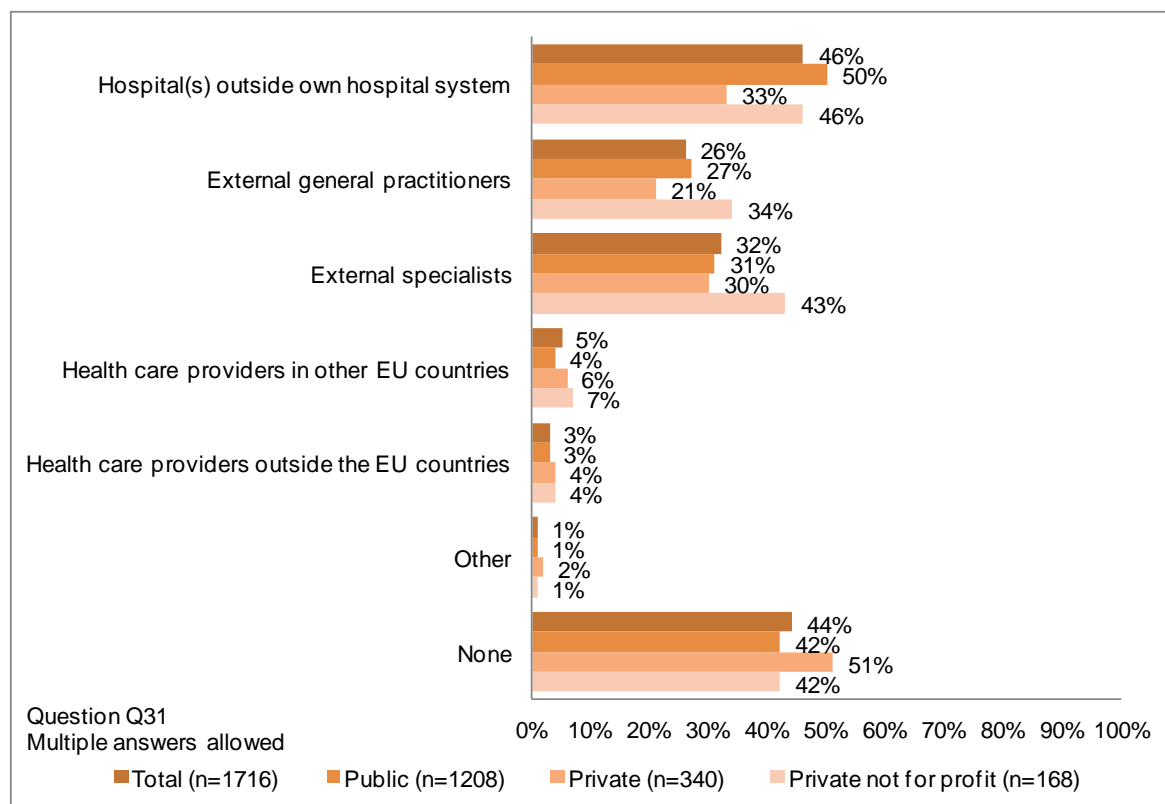
173 As already mentioned for other types of clinical information, there is a positive correlation between hospital size and the extent to which hospitals can electronically exchange radiology images and reports. The biggest hospitals tend to exchange more information about medication lists; only 22% of them do not exchange medication lists information, compared to 65% of hospitals with fewer than 101 beds. This correlation is observed for electronic information exchanges with any type of healthcare providers, except for the "None" category and for the exchange of medication lists with "Health care providers outside the EU countries".

Figure 52: Exchange of radiology images and reports, results by size

Answer to Q31: "Does your hospital exchange electronically radiology images and reports about patients with any of the following providers?"
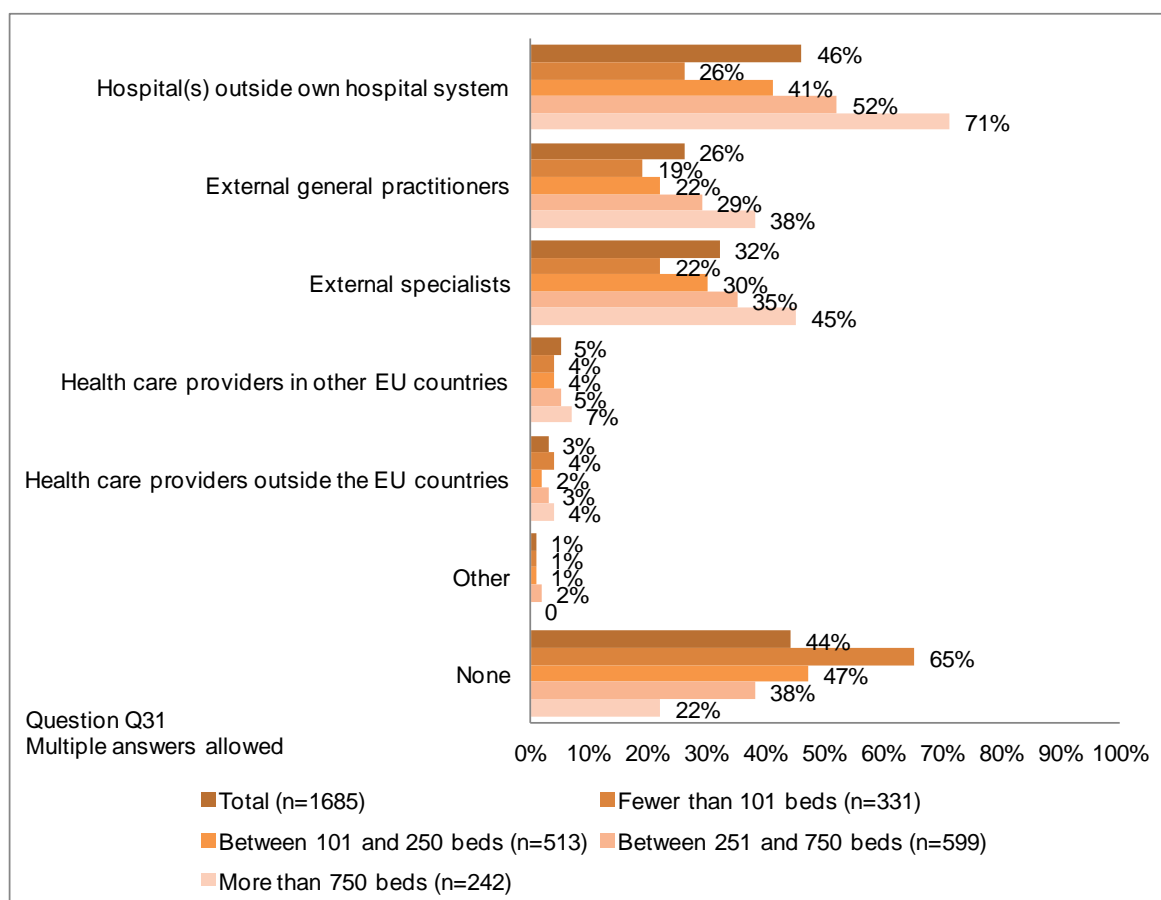

4.5.5   Interoperability of systems

174   The European Union has recently published several communications aiming at fostering interoperability of systems in the health sector. The Europe 2020 Strategy[69] points out the presence of a fragmented market in the health sector and the need to set up common standards in this area. As part of this, the Digital Agenda[70] proposes to stakeholders to engage in a dialogue on EU-wide standards, interoperability testing and certification of eHealth systems by 2015. In October 2010, the European Parliament adopted a report on the future of European standardisation[71] highlighting the importance of innovation and competitiveness linked to ICTs. In December 2010, the Calliope Network published a report on the European eHealth Interoperability Roadmap[72]. Only a few months later, Directive 2011/24/EU[73] described the importance of eHealth system interoperability in the context of cross-border healthcare.

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[69]   Europe 2020: A strategy for smart, sustainable and inclusive growth, European Commission, COM(2010) 2020 final.
[70]   A Digital Agenda for Europe, European Commission, COM(2010) 245 final/2.
[71]   Report on the future of European standardisation, European Parliament (2010/2051(INI)), October 2010.
[72]   European eHealth Interoperability Roadmap, Final European Progress Report, Calliope Network, December 2010.
[73]   Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare.

175   As shown on the bar chart below, 46% of European hospitals do not experience any interoperability problems. Interestingly, this result is lower than in 2010 (57%). A reason that may explain this difference is that more hospitals exchange information and those that recently started may need some time to solve potential interoperability problems. When a hospital experiences interoperability problems, it is more at the technical level (36% of the respondents) than at the semantic or organisational level (21% and 24% of respondents respectively).

Figure 53: Interoperability problems between departmental EPR systems, European level results

Answer to Q32: "You said that your hospital uses electronic patient records (EPRs) which share information. Do you encounter interoperability problems between the different departmental EPR systems?"

Base: n = 1314 (said 1 or 2 at Q23)
Question Q32
Multiple answers allowed
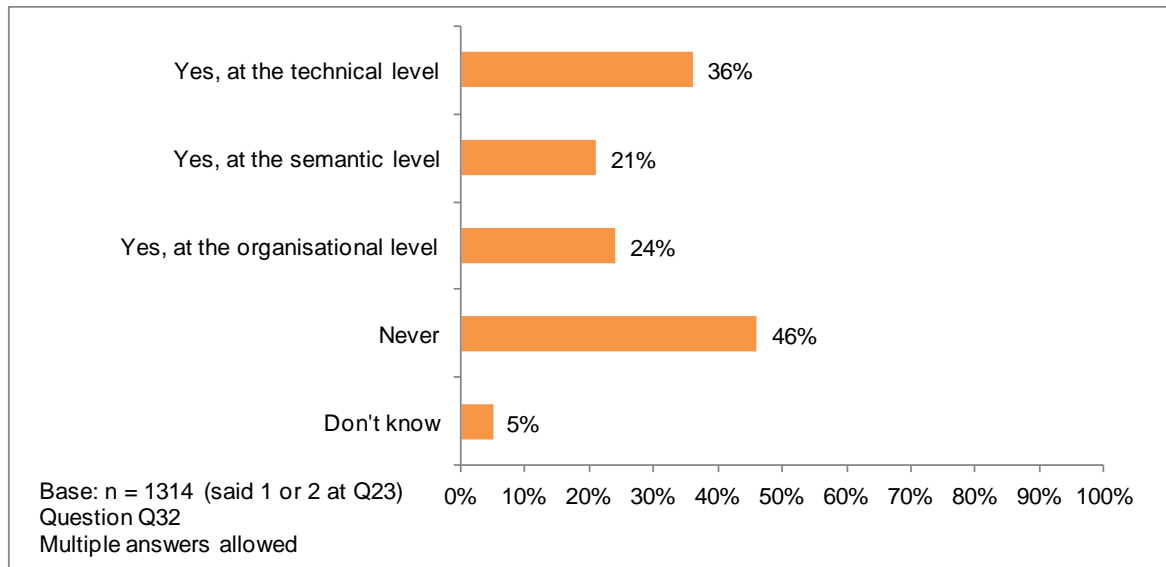
176   The countries where hospitals experience the least interoperability problems are Bulgaria, Hungary, Poland Slovakia and Slovenia. In contrast, Estonian, British and Norwegian hospitals experienced the most interoperability problems.

Figure 54: Interoperability problems between departmental EPR systems, Country-level results

Answer to Q32: "You said that your hospital uses electronic patient records (EPRs) which share information. Do you encounter interoperability problems between the different departmental EPR systems?"

Base: n=1314 Question Q32	Yes, at the technical level	Yes, at the semantic level	Yes, at the organisational level	Never
EU27+3	36%	21%	24%	46%
EU27	36%	21%	24%	46%
Austria	31%	13%	26%	51%
Belgium	30%	38%	36%	43%
Bulgaria	10%	5%	10%	79%
Croatia	40%	10%	20%	40%
Cyprus	40%	20%	0%	40%
Czech republic	31%	19%	22%	47%
Denmark	53%	20%	27%	47%
Estonia	58%	67%	33%	8%
Finland	48%	36%	36%	40%
France	39%	22%	27%	43%
Germany	37%	13%	24%	47%
Greece	44%	13%	23%	49%
Hungary	14%	5%	10%	71%
Iceland	44%	0%	44%	44%
Ireland	45%	45%	27%	27%
Italy	45%	38%	44%	31%
Latvia	43%	14%	7%	43%
Lithuania	56%	12%	6%	38%
Luxembourg	0%	67%	0%	33%
Malta	50%	50%	50%	50%
Netherlands	50%	58%	46%	27%
Norway	75%	25%	25%	25%
Poland	17%	5%	15%	68%
Portugal	22%	32%	22%	35%
Romania	44%	3%	12%	45%
Slovakia	18%	4%	7%	71%
Slovenia	0%	0%	33%	67%
Spain	32%	18%	20%	50%
Sweden	23%	14%	9%	59%
United Kingdom	62%	41%	24%	22%

177 Results by ownership type show that public hospitals encounter more interoperability problems than private ones. Between 39% and 28% of the surveyed public hospitals have technical, semantic or organisational problems between different departmental EPR systems. In fact, only 43% of public hospitals declared they never had such problems, compared to 54% of private hospitals and 58% of private not for profit hospitals.

Figure 55: Interoperability problems between departmental EPR systems, results by ownership

Answer to Q32: "You said that your hospital uses electronic patient records (EPRs) which share information. Do you encounter interoperability problems between the different departmental EPR systems?"
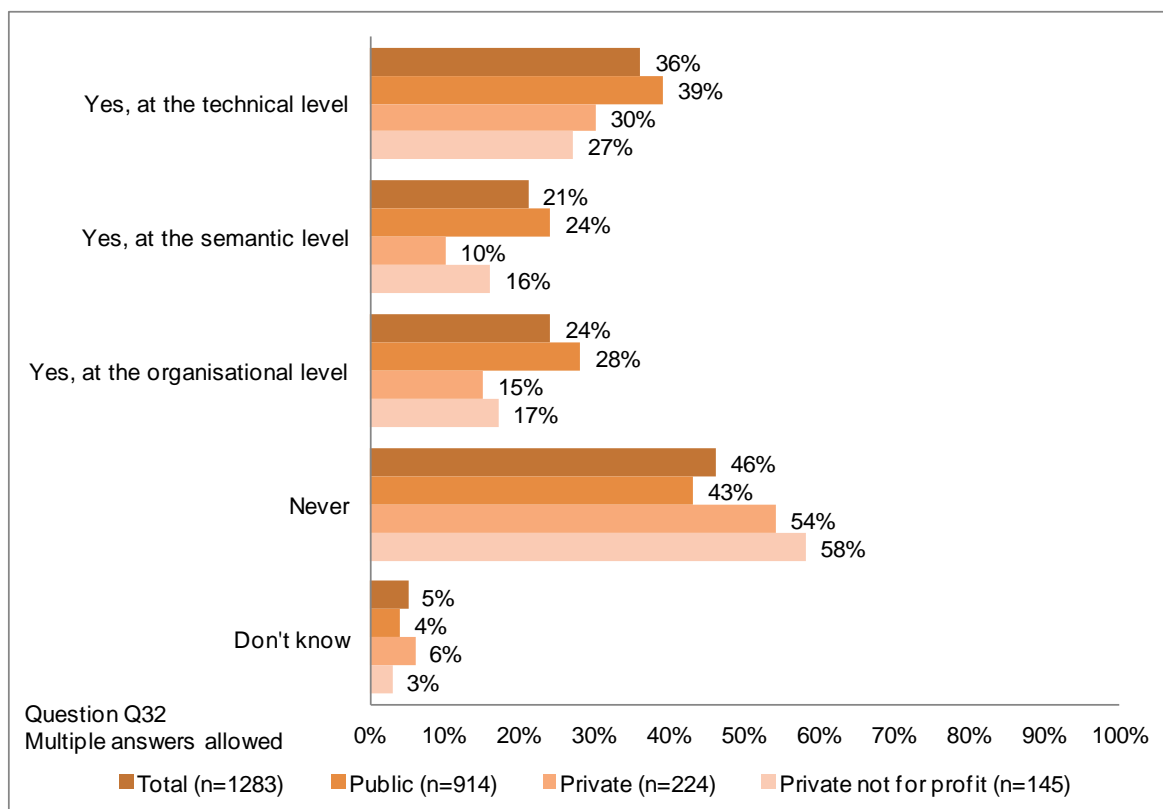
178 There seems to be a correlation between the size of hospitals and the presence of interoperability problems between the different departmental EPR systems: the bigger hospitals are, the more they encounter interoperability problems. However, the differences are more or less pronounced when considering the type of problem. Differences are evident for problems at the organisational and semantic levels, but they are less marked at technical level, as shown in Figure 56.

Figure 56: Interoperability problems between departmental EPR systems, results by size

Answer to Q32: "You said that your hospital uses electronic patient records (EPRs) which share information. Do you encounter interoperability problems between the different departmental EPR systems?"
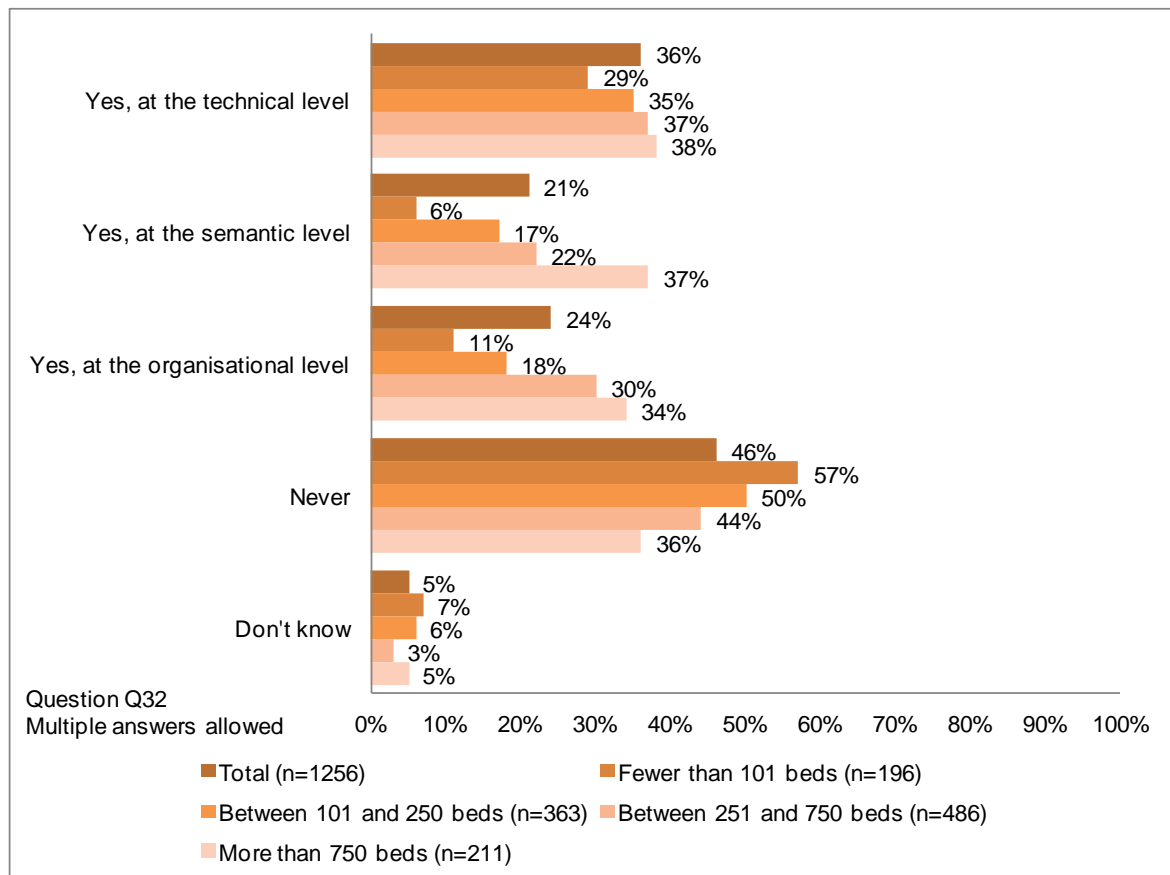
4.5.6   Standards supported by the EPR systems

179   In terms of standards used, the majority of the European hospitals use the HL7 (63%) and DICOM (60%) standards. IHE integration profiles, CEN/ISO EN13606 and OpenEHR are standards that are significantly less supported. The figure below presents these results.

Figure 57: Type of standards the hospital comply with, European level results

Answer to Q34: "Which standards does your system support or comply with?"
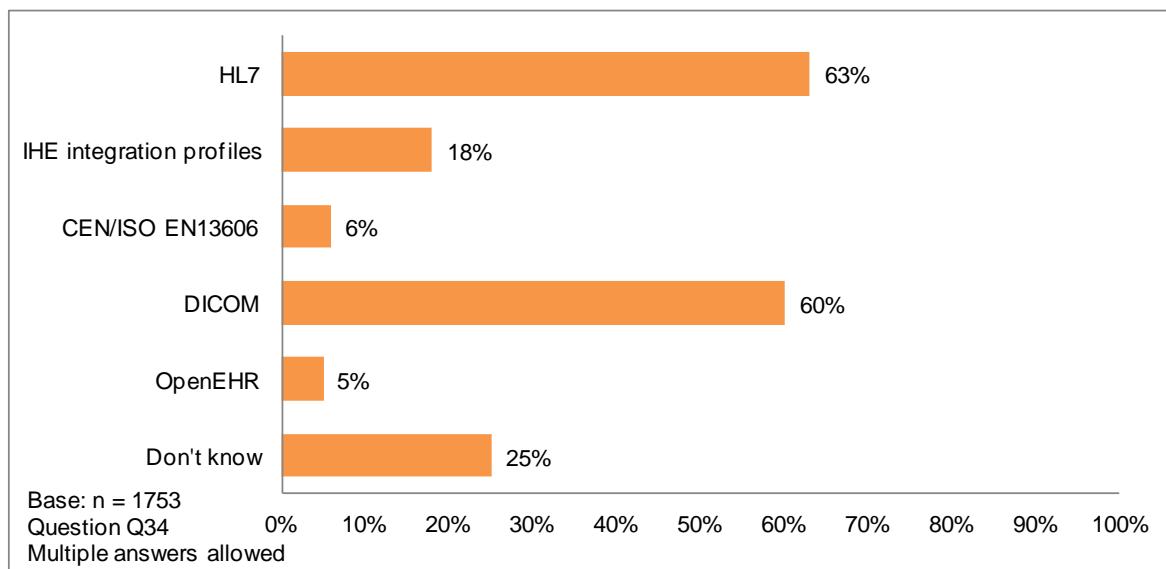
180   Interestingly, the respondents' ability to answer this question varied from country to country. In some Nordic countries (Denmark, Iceland and Norway) and Eastern countries (Bulgaria, Lithuania and Romania) as well as in Cyprus and the UK a high proportion of respondents were not able to answer. While this limits our ability to properly analyse the situation, one aspect which can be noted is that there does not seem to be a correlation between the size or the geographical area of the country and the type of standard used.

4.6   Block E. Security and privacy

181   Following the 1995 Directive on data protection[74], the European Commission adopted a new legal framework for the protection of personal data in the EU[75] to take into account the increase in data flows and exchanges through the Internet and social media usage. The new rules intend to:

- Improve individuals' ability to control their data;
- Improve the means for individuals to exercise their rights;
- Reinforce data security; and
- Enhance the accountability of those processing data.

182   Questions Q35 to Q39 of the questionnaire cover the strategies taken at different levels to protect patient data.

Key findings of this survey block:
- More than 90% of hospitals surveyed have regulations to guarantee the privacy and security of data, either at national (58%), regional (27%) or hospital level (66%).
- Almost 100% of the hospitals surveyed have a security measure to protect patient data from confidentiality breach or data losses. The most common protection measures are a workstation access protected by a password, the encryption of transmitted data, and the encryption of stored data. Digital signature certification and a workstation with access through a card are less used.
- 85% of hospitals surveyed have clear rules for accessing patients' electronic medical data.
- 73% of hospitals have an archive strategy for long-term storage and disaster recovery.
- Hospitals within Nordic countries appear to have better data security and privacy, with a leading group composed of Austria, Denmark, Finland, Norway and the UK, while results are generally low for Eastern countries such as Lithuania, Poland, Romania and Slovenia, as well as Greece.
- The largest hospitals seem to ensure better data protection than small and medium-sized hospitals.
- Results are similar between private and public hospitals.

4.6.1   Regulations for the protection of patient data

183   Figure 58 shows that the vast majority of hospitals adopt regulations on patient data protection (only 5% do not adopt them at all). This is similar to the previous survey's results (3%). When regulations are taken into account, they are more usually implemented at hospital level (66% of respondents) or at national level (58%) rather than at regional level (27%). Interestingly, these results are lower than in 2010. This could be explained by the larger sample size, by the increased complexity of systems/applications lacking regulation or by the fact that hospitals have recently begun to implement eHealth technologies and are not aware of such regulations.

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[74]   Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data.

[75]   Proposal for a Directive of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data by competent authorities for the purposes of prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and the free movement of such data, COM(2012) 10 final.

Figure 58: Presence of regulations to guarantee the security and privacy of electronic patient medical data, European level results

Answer to Q35: "Is there any regulation in use that guarantees the security and privacy of electronic patient medical data?"

Base: n = 1753
Question Q35
Multiple answers allowed
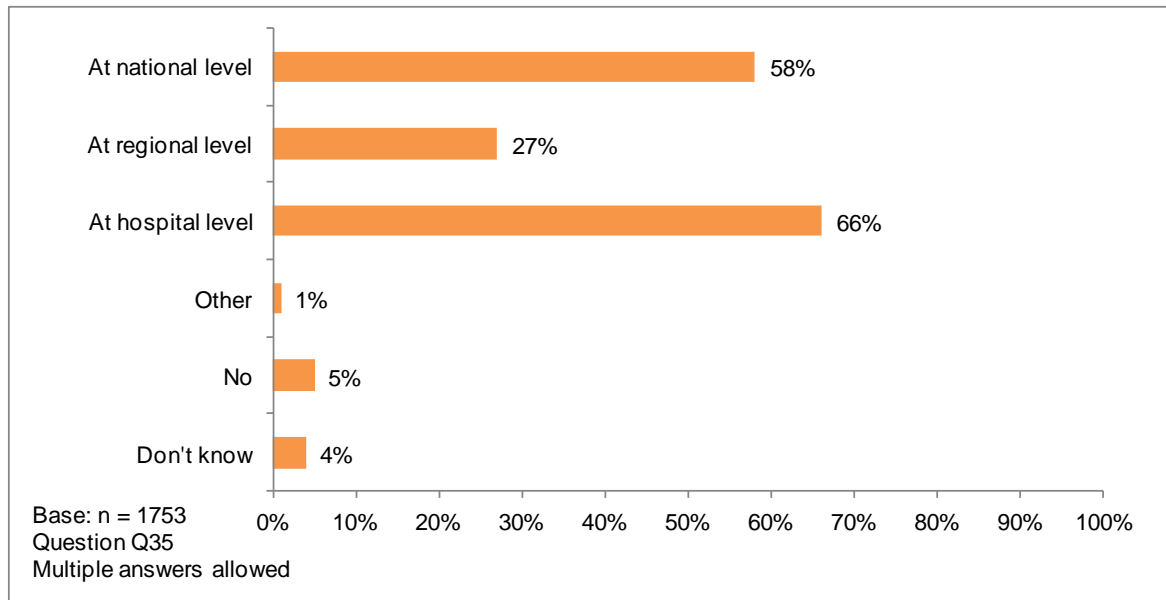
184 Countries behind in terms of patient data protection include Cyprus, Greece, Lithuania and Poland. This may be due to the lack of national regulations compared to the European average. Higher proportions of hospitals having regional regulations are observed for countries where regions have more autonomy (Italy, Spain and UK) but also in Denmark and Finland.

Figure 59: Presence of regulations to guarantee the security and privacy of electronic patient medical data, Country-level results

Answer to Q35: "Is there any regulation in use that guarantees the security and privacy of electronic patient medical data?"

Base: n=1753 Question Q35 Multiple answers allowed	At national level	At regional level	At hospital level	Other	No
EU27+3	58%	27%	67%	1%	5%
EU27	57%	28%	67%	1%	6%
Austria	65%	51%	84%		5%
Belgium	60%	16%	72%		2%
Bulgaria	68%	23%	55%	2%	6%
Croatia	64%		55%		
Cyprus	15%		54%	8%	23%
Czech republic	25%	20%	78%		8%
Denmark	94%	56%	62%		
Estonia	100%	8%	75%		
Finland	88%	65%	92%		
France	48%	18%	68%	1%	7%
Germany	46%	31%	78%	1%	3%
Greece	26%	7%	56%	3%	15%
Hungary	42%	5%	88%		2%
Iceland	56%	22%	78%		
Ireland	83%	43%	78%		
Italy	88%	48%	60%		1%
Latvia	79%	16%	63%		5%
Lithuania	34%	12%	59%		19%
Luxembourg	100%	33%	100%		
Malta	100%				
Netherlands	81%	31%	69%		
Norway	83%	17%	50%		
Poland	32%	6%	56%	2%	18%
Portugal	56%	7%	71%		2%
Romania	44%	4%	80%		6%
Slovakia	48%		70%		6%
Slovenia	100%		17%		
Spain	75%	57%	56%		1%
Sweden	92%	35%	27%		
United Kingdom	83%	77%	72%		

185 Figure 60 shows that the three hospital ownership categories recorded similar results concerning the availability of regulations designed to protect electronic patient medical data, with a variance of less than 7 percentage points across the three categories.

Figure 60: Presence of regulations to guarantee the security and privacy of electronic patient medical data, results by ownership

Answer to Q35: "Is there any regulation in use that guarantees the security and privacy of electronic patient medical data?"

Base: n=1716
Question Q35
Multiple answers allowed

Total (n=1716)   Public (n=1208)   Private (n=340)   Private not for profit (n=168)
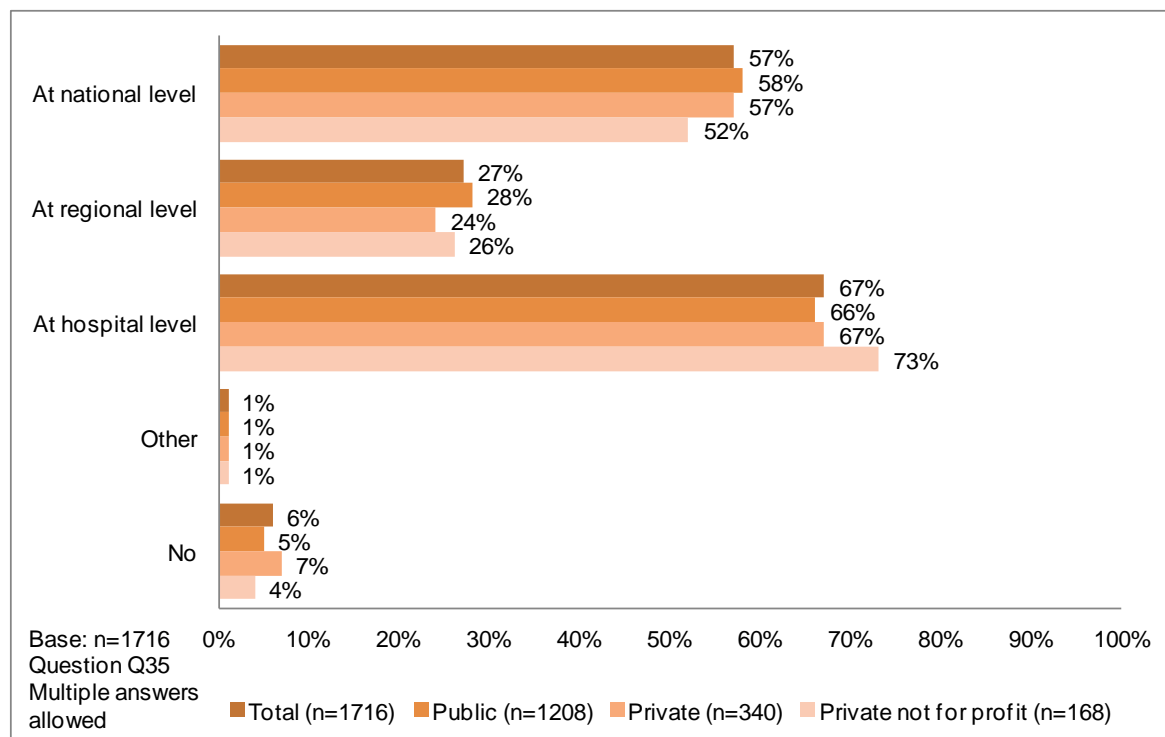
186   The majority of hospitals across all size categories have regulations in place guaranteeing security and privacy of data at both national and hospital level. Percentages are highest for larger hospitals and can reach respectively 69% and 72%, while hospitals with less than 251 beds report relatively smaller values (from 50% to 66%). Regional level regulations are not very widely implemented in comparison.

187   The analysis reveals no clear correlation between hospital size and the availability of regulations guaranteeing the security and privacy of electronic patient data. However, larger hospitals tend to have more regulations of this type (only 3% of hospitals with more than 251 beds said they did not have such regulations, compared to around 8% of hospitals with 250 beds or fewer).

Figure 61: Presence of regulations to guarantee the security and privacy of electronic patient medical data, results by size

Answer to Q35: "Is there any regulation in use that guarantees the security and privacy of electronic patient medical data?"

Base: n=1685
Question Q35
Multiple answers allowed

Total (n=1685)
Fewer than 101 beds (n=331)
Between 101 and 250 beds (n=513)
Between 251 and 750 beds (n=599)
More than 750 beds (n=242)
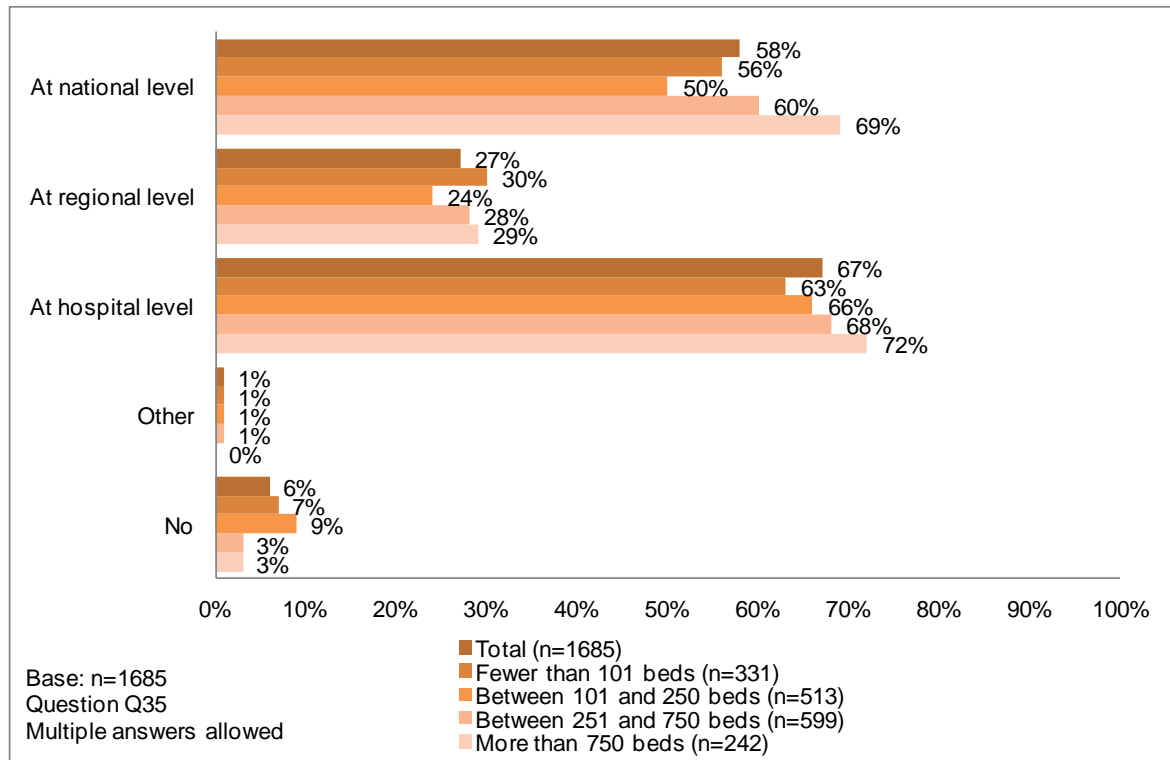
4.6.2   Security measures

188   All but 7 of the hospitals surveyed have at least one security measure to protect patient data from any confidentiality breach or data losses. The most common protection measure is "Workstation access protected by a password" (93% of the hospitals). "Encryption of transmitted data" and "Encryption of stored data" are used by respectively 58% and 37% of the hospitals surveyed. Additional (though less commonly used) security measures are "Digital signature certification" and "Workstation with access through card", for 30% and 18% of respondents respectively.

Figure 62: Type of security measures taken to protect patient data, European level results

Answer to Q36: "Which security measures are taken to protect patient data?"

Security measure	Percentage
Encryption of stored data	37%
Encryption of transmitted data	58%
Workstation with access through card	18%
Workstation with access through fingerprint	3%
Workstation with access through password	93%
Data entry certified with digital signature	30%
Other	6%
Don't know	2%

Base = 1753
Question Q36
Multiple answers allowed
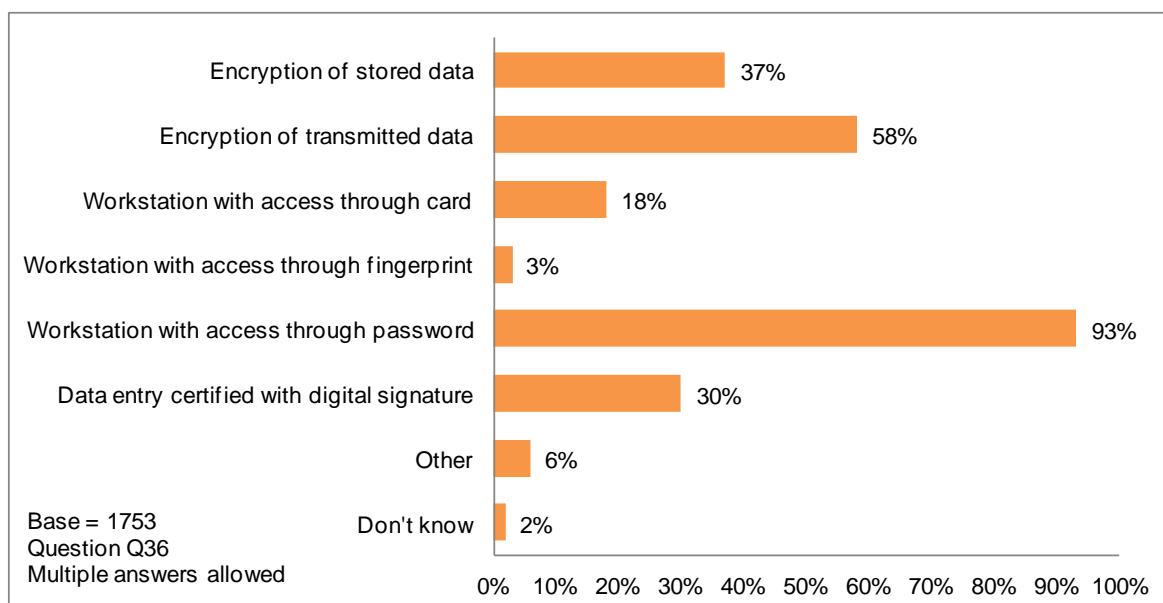
189   At national level, the countries in which hospitals make the highest use of security measures to ensure patient data privacy and confidentiality are Finland, Estonia, Romania, Luxembourg, the UK and Austria. Conversely, the countries with the lowest use of security measures are Slovenia, Iceland, Cyprus, Greece and Latvia.

Figure 63: Type of security measures taken to protect patient data, Country-level results

Answer to Q36: "Which security measures are taken to protect patient data?"

Base: n=1753 Question Q36 Multiple answers allowed	Encryption of stored data	Encryption of transmitted data	Workstation with access through card	Workstation with access through fingerprint	Workstation with access through password	Data entry certified with digital signature	Other
EU27+3	37%	58%	18%	3%	93%	30%	6%
EU27	37%	58%	18%	3%	94%	31%	6%
Austria	40%	86%	26%	12%	95%	26%	7%
Belgium	28%	82%	20%	10%	92%	40%	8%
Bulgaria	37%	50%	10%		92%	37%	2%
Croatia	36%	18%	18%		82%	18%	
Cyprus	38%	15%	8%		69%	8%	8%
Czech republic	45%	50%			100%	15%	
Denmark	31%	44%	12%		88%	88%	
Estonia	33%	83%	58%		75%	58%	33%
Finland	69%	77%	27%	4%	100%	31%	19%
France	26%	62%	21%	1%	97%	37%	3%
Germany	40%	69%	15%	3%	98%	25%	6%
Greece	18%	16%	3%		91%	10%	3%
Hungary	53%	51%	5%		95%	5%	2%
Iceland	11%	56%			56%	11%	11%
Ireland	43%	70%	4%		91%	22%	9%
Italy	36%	57%	25%	1%	93%	53%	9%
Latvia	11%	21%	11%		89%	16%	
Lithuania	28%	34%	22%		84%	38%	9%
Luxembourg	67%	33%	67%		100%	33%	
Malta	50%	50%			100%		50%
Netherlands	23%	69%	38%	8%	92%	23%	23%
Norway		50%	17%		83%	17%	17%
Poland	29%	38%	6%	1%	90%	7%	2%
Portugal	22%	24%	2%	22%	93%	5%	2%
Romania	59%	85%	14%	2%	88%	59%	11%
Slovakia	33%	52%	3%		97%	9%	9%
Slovenia			33%		83%		
Spain	44%	68%	21%	2%	99%	38%	3%
Sweden	54%	62%	58%		88%	42%	8%
United Kingdom	80%	62%	35%	13%	91%	12%	1%

4.6.3 Rules governing access to patients' medical data

190 In addition to security measures, patient data are also protected by rules on accessing electronic patient files in order to prevent unauthorised access to the patients' confidential information. As shown in the chart below, 83% of hospitals surveyed declared they have clear rules for accessing patients' electronic medical data.

Figure 64: Presence of clear and structured rules on accessing patients' electronic medical data, European level results

Answer to Q37: "Are there clear structured rules on accessing (reading-writing) patients' electronic medical data?"

Base: n = 1753
Question Q37
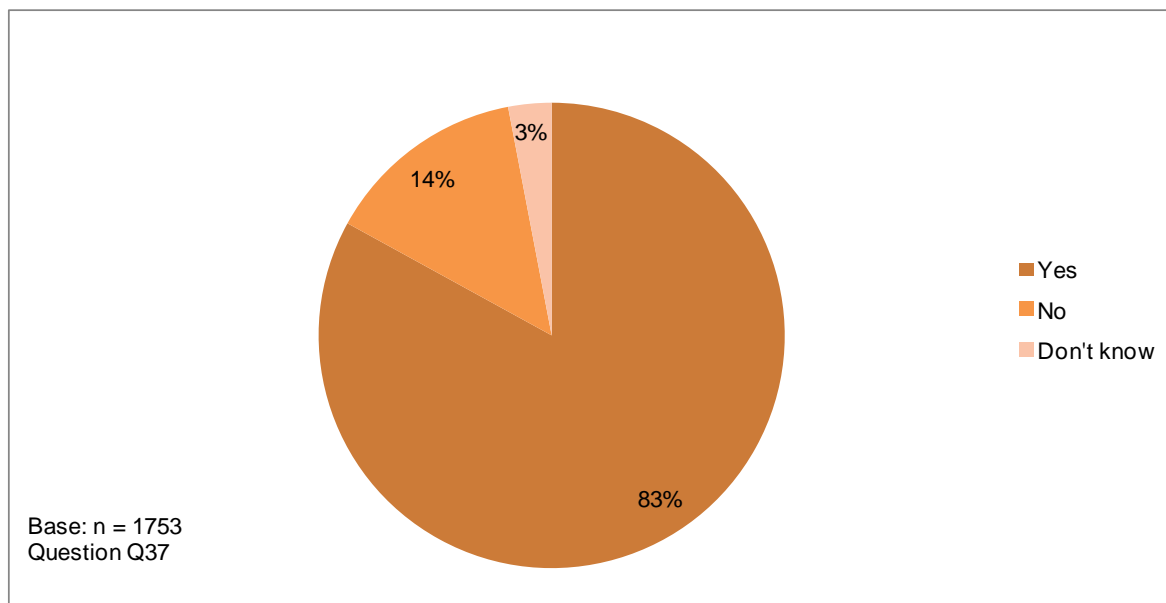
191 Among the national level results, hospitals in three Nordic countries (Denmark, Finland and Norway) and Croatia stated that they have clear structured rules on accessing patients' electronic medical data. In contrast with these leaders, in Greece, Luxembourg and Lithuania, more than 30% of hospitals said they did not have any such rules.

Figure 65: Presence of clear and structured rules on accessing patients' electronic medical data, Country-level results

Answer to Q37: "Are there clear structured rules on accessing (reading-writing) patients' electronic medical data?"

Country	Yes	No
EU27+3	85%	15%
EU27	85%	15%
Austria	88%	12%
Belgium	94%	6%
Bulgaria	92%	8%
Croatia	100%	
Cyprus	73%	27%
Czech republic	95%	5%
Denmark	100%	
Estonia	92%	8%
Finland	100%	
France	81%	19%
Germany	91%	9%
Greece	67%	33%
Hungary	91%	9%
Iceland	78%	22%
Ireland	90%	10%
Italy	86%	14%
Latvia	78%	22%
Lithuania	63%	37%
Luxembourg	67%	33%
Malta		
Netherlands	88%	12%
Norway	100%	
Poland	76%	24%
Portugal	84%	16%
Romania	78%	22%
Slovakia	85%	15%
Slovenia	83%	17%
Spain	94%	6%
Sweden	96%	4%
United Kingdom	85%	15%

Base: n = 1701
Question Q37
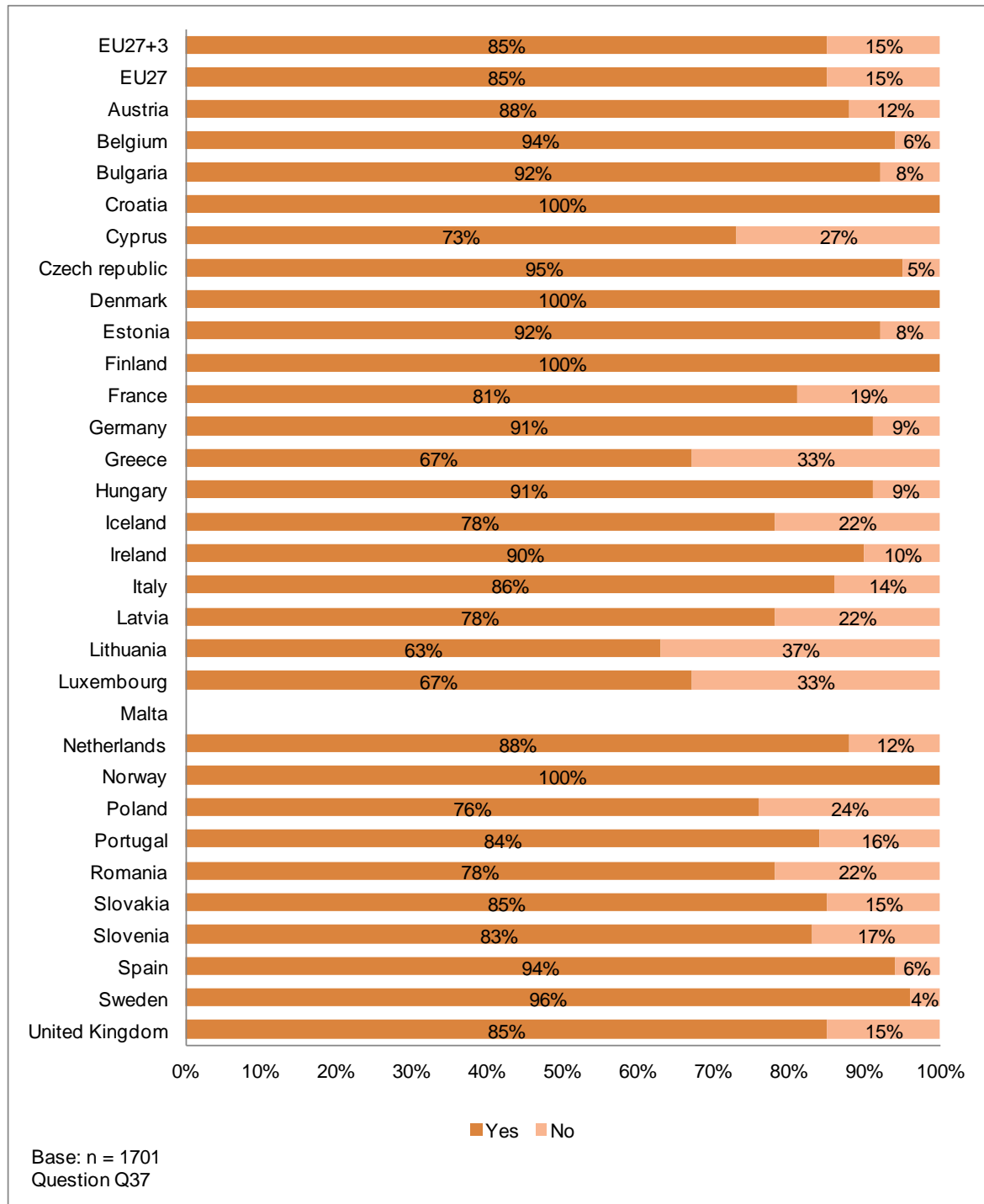
192   There is no significant difference between private and public hospitals in terms of rules on accessing patients' electronic medical data. However, 92% of private not for profit hospitals have such rules, followed by private hospitals (84%) and public hospitals (81%), as shown in Figure 66.

Figure 66: Presence of clear and structured rules on accessing patients' electronic medical data, results by ownership

Answer to Q37: "Are there clear structured rules on accessing (reading-writing) patients' electronic medical data?"

Base: n=1716
Question Q37

■ Total (n=1716) ■ Public (n=1208) ■ Private (n=340) ■ Private not for profit (n=168)
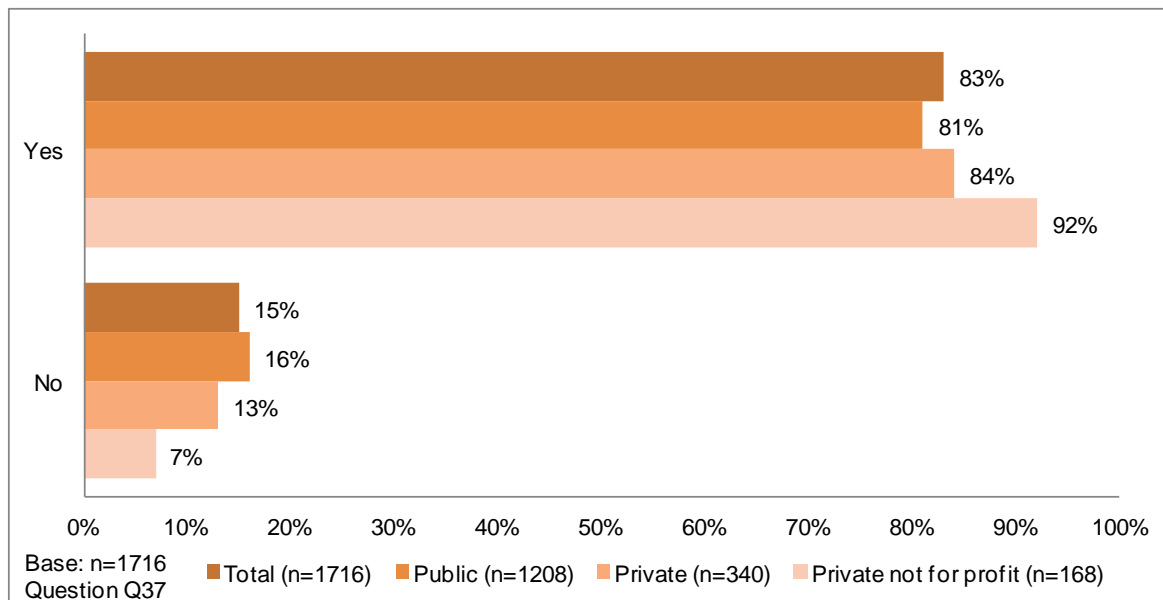
193 As shown in Figure 67, 88% of hospitals with more than 750 beds said they have such rules, as opposed to 76% of hospitals with fewer than 101 beds. Both other categories of hospitals by size occupy an intermediate position.

Figure 67: Presence of clear and structured rules on accessing patients' electronic medical data, results by size

Answer to Q37: "Are there clear structured rules on accessing (reading-writing) patients' electronic medical data?"

Base: n=1685
Question Q37

■ Total (n=1685)
■ Fewer than 101 beds (n=331)
■ Between 101 and 250 beds (n=513)
■ Between 251 and 750 beds (n=599)
■ More than 750 beds (n=242)
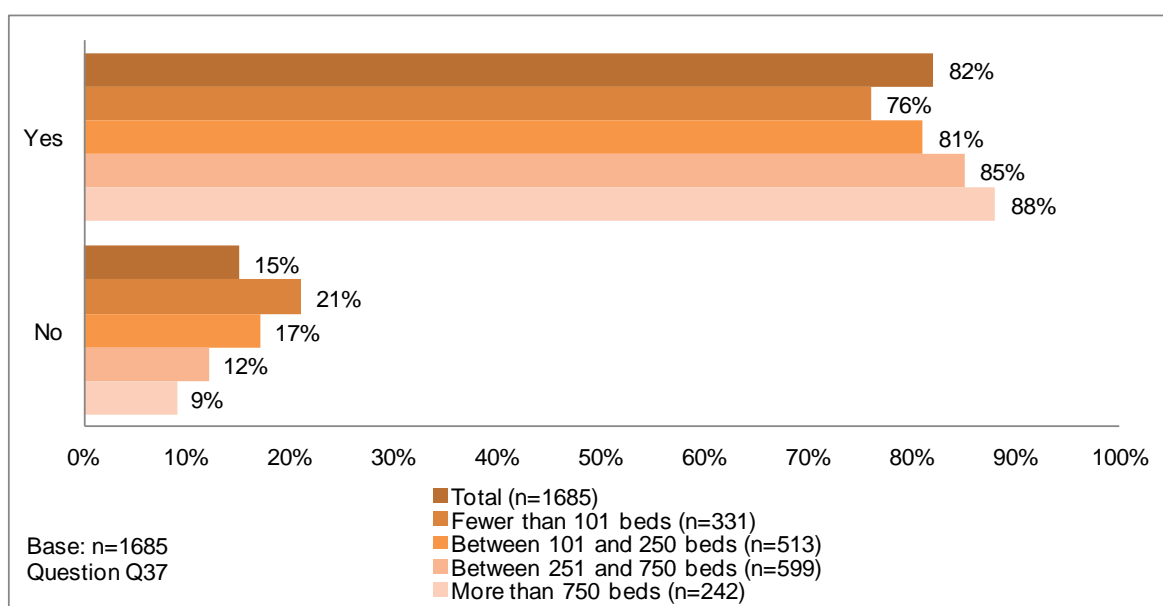
4.6.4 Archive strategy for storage and disaster recovery

194 With regard to data security, hospitals generally need to have a strategy to ensure long-term secured storage of data to avoid any loss, physical deterioration, or destruction due to bad storage conditions or following a natural disaster. 73% of hospitals declared they had an archive strategy for long-term storage and disaster recovery, as shown in Figure 68, while 23% of hospitals have not implemented a data recovery strategy.

Figure 68: Availability of an enterprise archive strategy for long-term storage and disaster recovery, European level results

Answer to Q38: "Does your hospital have an enterprise archive strategy for long-term storage and disaster recovery?"

Base: n = 1753
Question Q38
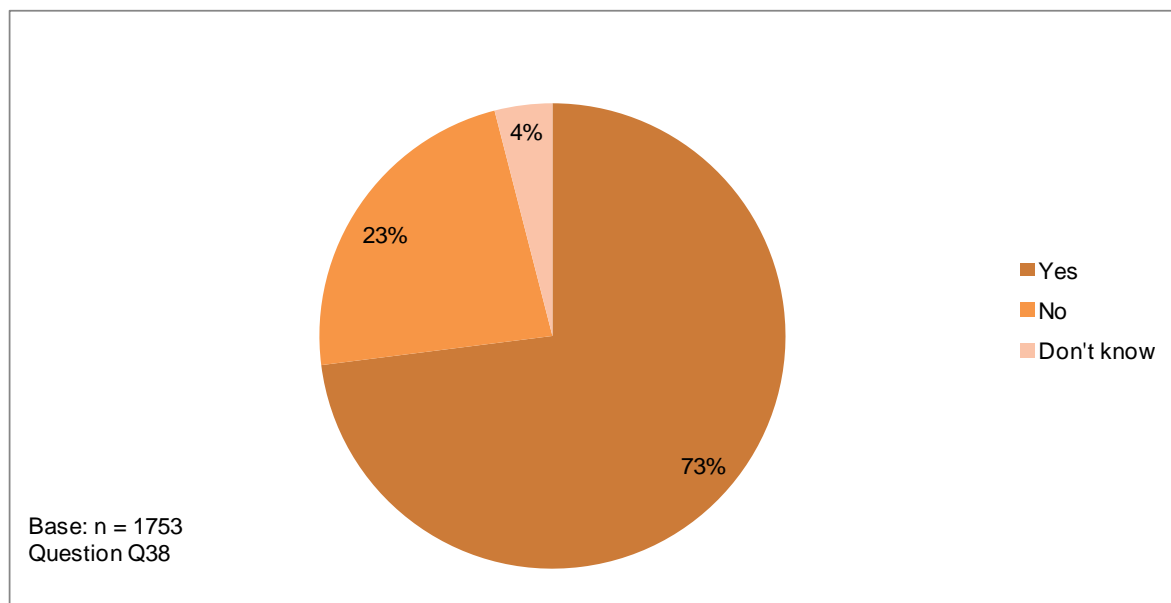
195 In 4 countries out of 30, all hospitals surveyed answered positively as to whether they have an archiving strategy for long-term storage and disaster recovery in less than 24 hours. These countries were Denmark, Luxembourg, Malta and Norway. By contrast, Eastern European countries such as Estonia, Lithuania, Poland, Romania and Slovenia, together with Greece and Portugal, are lagging behind in terms of rapid disaster recovery.

Figure 69: Availability of an enterprise archive strategy for long-term storage and disaster recovery, Country-level results

Answer to Q38: "Does your hospital have an enterprise archive strategy for long-term storage and disaster recovery?"

Country	Yes	No
EU27+3	76%	24%
EU27	76%	24%
Austria	84%	16%
Belgium	80%	20%
Bulgaria	70%	30%
Croatia	82%	18%
Cyprus	73%	27%
Czech republic	87%	13%
Denmark	93%	7%
Estonia	100%	
Finland	77%	23%
France	71%	29%
Germany	83%	17%
Greece	69%	31%
Hungary	64%	36%
Iceland	86%	14%
Ireland	65%	35%
Italy	79%	21%
Latvia	88%	12%
Lithuania	45%	55%
Luxembourg	100%	
Malta		
Netherlands	88%	12%
Norway	83%	17%
Poland	63%	37%
Portugal	64%	36%
Romania	60%	40%
Slovakia	81%	19%
Slovenia	60%	40%
Spain	91%	9%
Sweden	100%	
United Kingdom	98%	2%

Base: n = 1753
Question Q38

■ Yes ■ No
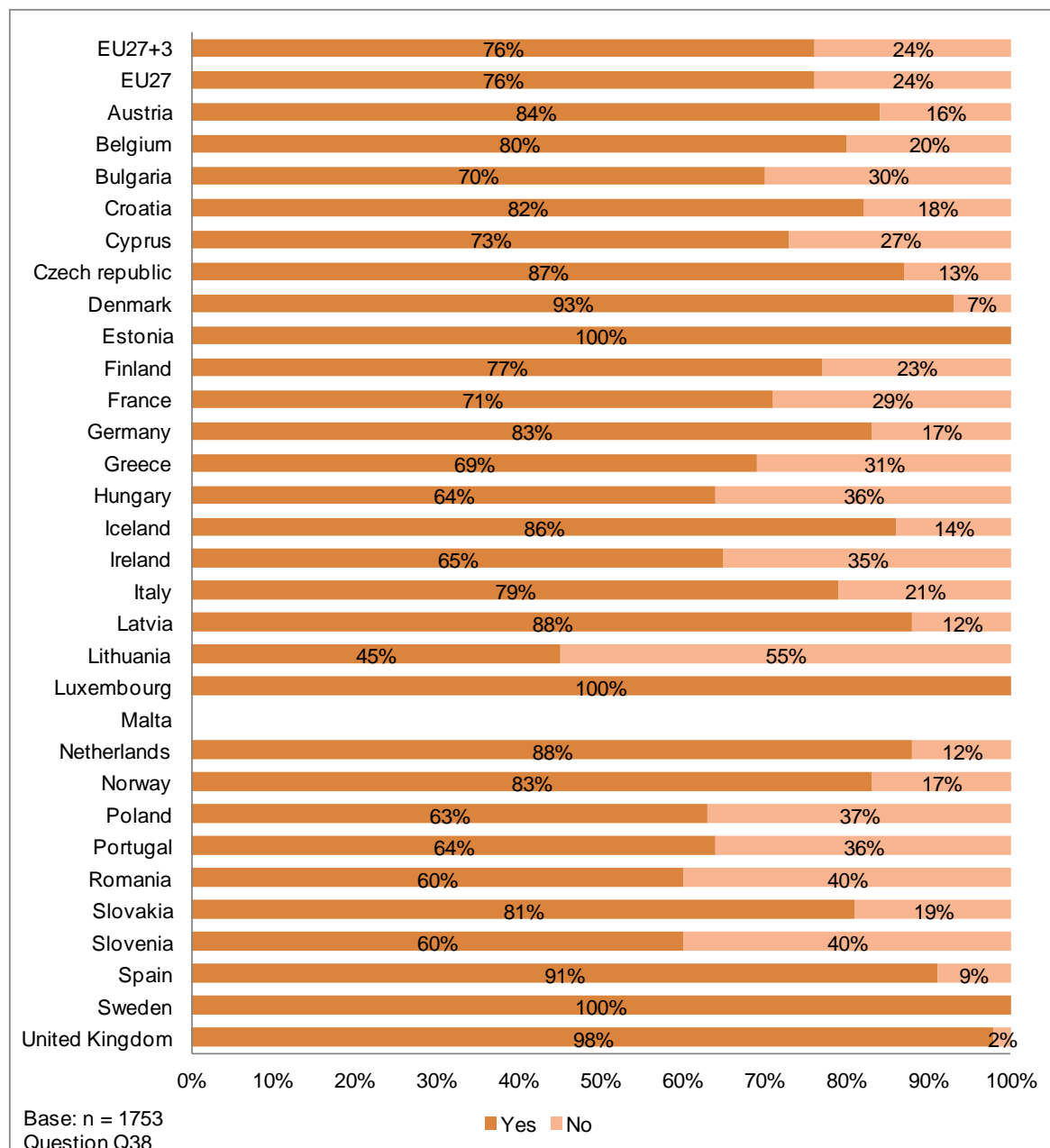
4.6.5   Timing for restoring information after loss of data

196   Another criterion to evaluate data security levels in hospitals is their ability to restore information quickly, based on the time needed to recover the data. Only a minority of hospitals (14%) declared that they have fully redundant data which allows them to restore information immediately. This result is partly balanced by the fact that 42% of the surveyed hospitals declared that they could restore information in less than 24 hours. Taking these two figures together, 60% of hospitals have the ability to restore data in a short period of time. The remaining 40% of hospitals would take more than one day to restore data, as illustrated by Figure 70.

Figure 70: Restoring capacity of critical clinical information system operations, European level results

Answer to Q39: "Please estimate how quickly your organisation can restore critical clinical information system operations"

Base: n = 1753
Question Q39

Legend:
- Immediate (we have a fully redundant data centre) — 14%
- Less than 24 hours — 42%
- Less than 2 days — 17%
- Less than 1 week — 13%
- Less than 1 month — 4%
- More than 1 month — 2%
- Don't know — 7%
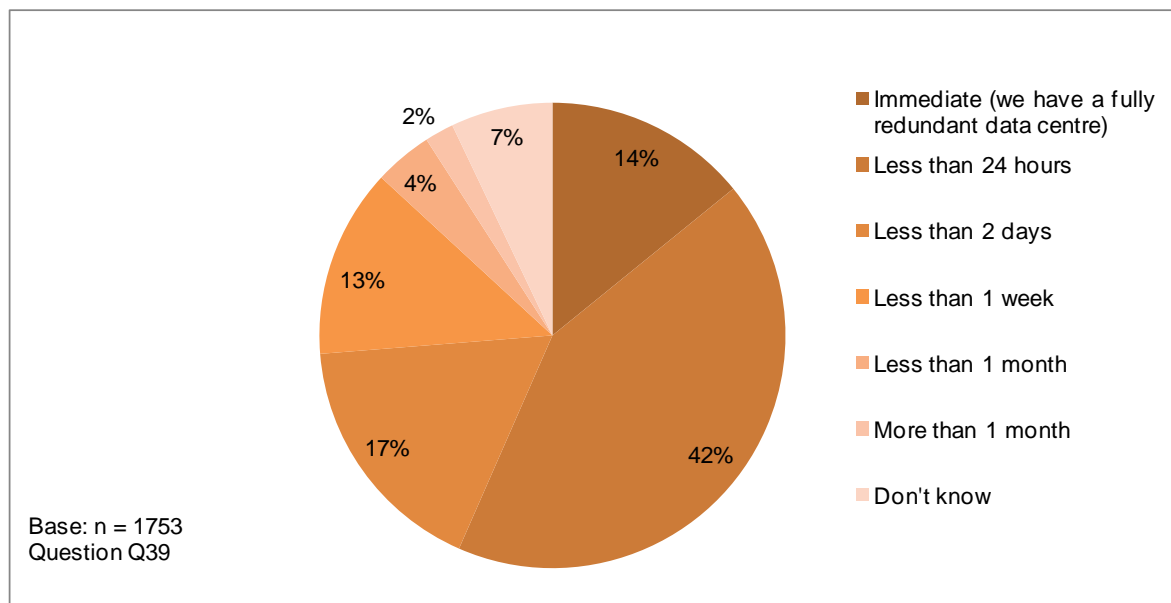
197   Countries that are the best prepared to face data losses are Malta, Denmark and Luxembourg, since all the hospitals from these countries can restore information either immediately or in less than 24 hours. Other countries which perform well are Iceland, Norway, Austria and Netherlands, where more than 80% of hospitals are able to restore information in the same period of time. Conversely, more than half of the hospitals surveyed in Greece, Romania, Lithuania and Portugal would take more than one day to restore critical medical information.

101

Figure 71: Restoring capacity of critical clinical information system operations, Country-level results

Answer to Q39: "Please estimate how quickly your organisation can restore critical clinical information system operations"

Base: n= 1626
Question Q39
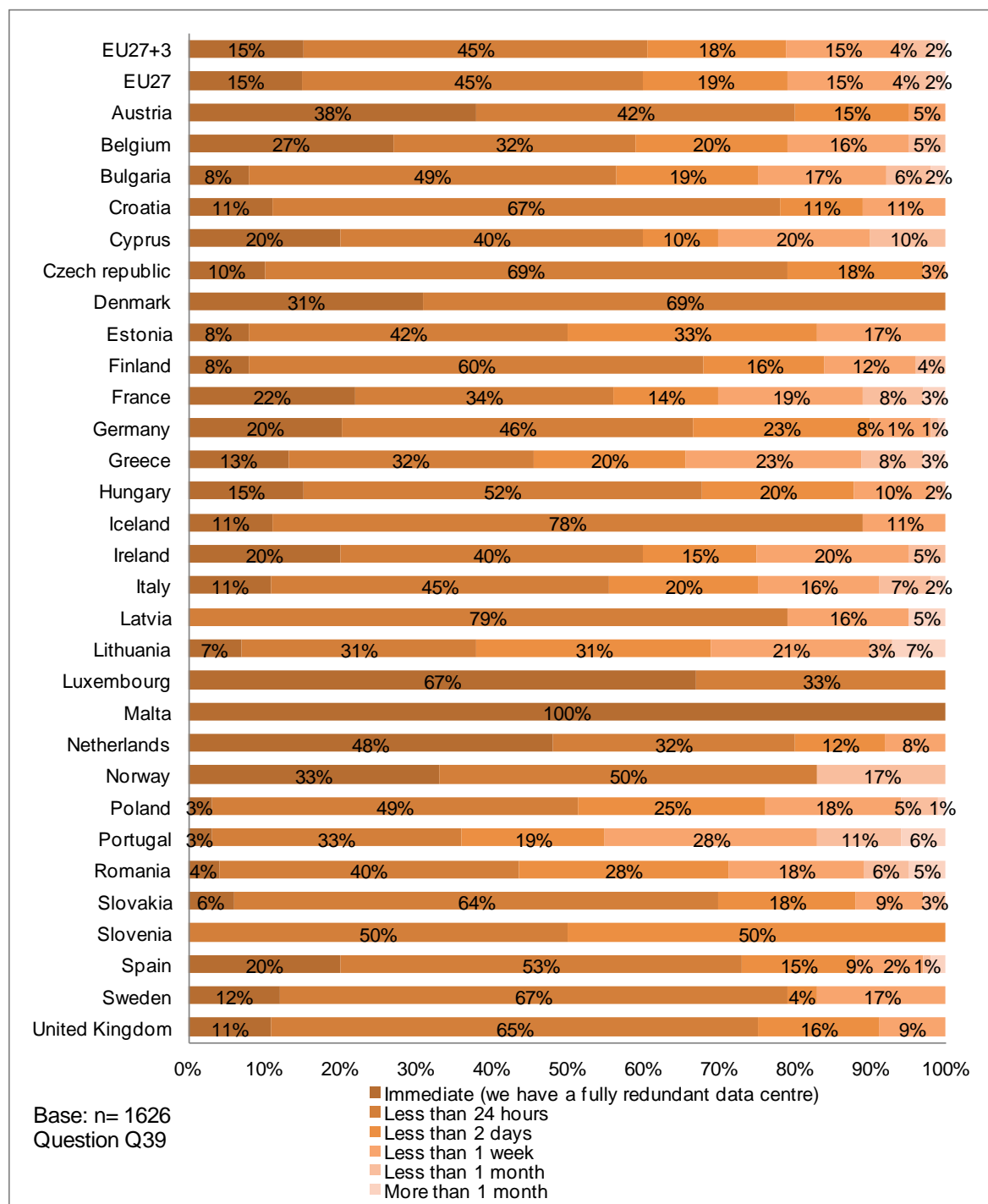
4.7   Block F. IT functionalities

198   This block explores the answers to questions Q40 to Q45 of the questionnaire regarding IT functionalities for entering, viewing, storing, managing and exchanging information on patients. Questions 40 and 41 deal with the availability and use of Electronic Medical Records (EMRs), Electronic Health Records (EHRs) and Electronic Patient Records (EPRs) as well as their different functional modules.

Key findings of this survey block:

- Within EMR/EHR/EPR functionalities, laboratory test results and radiology information have the highest implementation levels.
- Hospitals with eHealth functionalities mostly use them routinely.
- Regarding clinical decision support functionalities, the implementation level in the majority of the units is similar to the non-implementation level.
- Alerts to a critical laboratory value are the most available clinical decision support functionality.
- Non-implementation of Health Information Exchange (HIE) is still very high, except for receiving laboratory reports (62% implemented). However, these reports are only sent and shared in 42% of cases.
- Nordic and Baltic countries are forerunners in HIE, with high implementation and usage.
- Although the HIE functionality "Transfer of prescriptions to pharmacists" is only implemented in 26% of the surveyed hospitals, it is widely used, with a total implementation score of 89%.
- Telehealth is only implemented to a minor extent and is mostly available for holding consultations with other healthcare practitioners (31%).
- Telehealth with patients is not very common (implemented in less than 12% of the surveyed hospitals on average).
- However, when telehealth is implemented, it is mostly used (usage in around 90% of the surveyed hospitals on average).
- In the transition process from paper-based to electronic systems, 41% use a hybrid model.
- Results by hospital ownership and size in this transition process do not differ much from one category to another.

4.7.1   EMRs/EHRs/EPRs availability

199   Answers to question Q40 highlight that, at European level, 71% of the respondents have implemented this type of ICT system.

Figure 72: Availability of EMRs / EHRs / EPRs, European level results

Q40. "Electronic Medical Records" (EMRs) or "Electronic Health Records" (EHRs) or "Electronic Patient Records" (EPRs) are terms which refer to systems that are used by healthcare professionals (doctors and nurses) to enter, store, view, and manage patient health and administrative information and data. Does your hospital have this type of ICT-supported systems?

Base: n = 1753
Question Q40
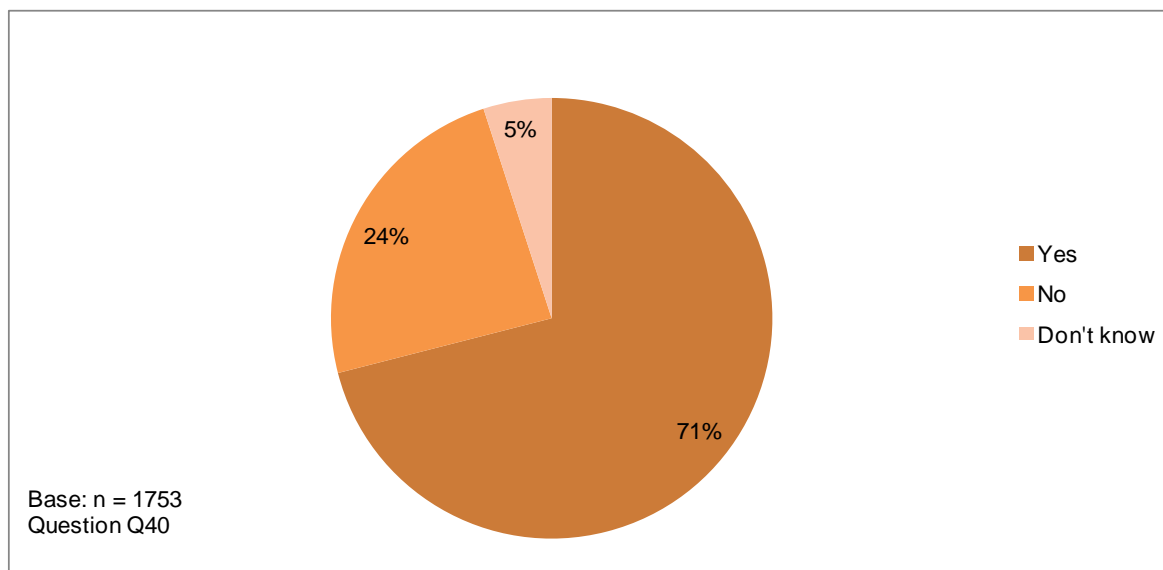
200   Looking at the national level, all surveyed hospitals in Estonia, Finland, Iceland, Luxembourg, Malta and Norway are using these systems and more than 90% of Danish, Hungarian, Dutch, Spanish and Swedish hospitals are also doing so. Among the countries with the lowest level of implementation are Lithuania (43%), Cyprus (46%) and Slovenia (50%).

Figure 73: Availability of EMRs / EHRs / EPRs, Country-level results

Q40. "Electronic Medical Records" (EMRs) or "Electronic Health Records" (EHRs) or "Electronic Patient Records" (EPRs) are terms which refer to systems that are used by healthcare professionals (doctors and nurses) to enter, store, view, and manage patient health and administrative information and data. Does your hospital have this type of ICT-supported systems?

Country	Yes	No
EU27+3	75%	25%
EU27	75%	25%
Austria	90%	10%
Belgium	88%	12%
Bulgaria	54%	46%
Croatia	80%	20%
Cyprus	46%	54%
Czech republic	78%	22%
Denmark	94%	6%
Estonia	100%	
Finland	100%	
France	79%	21%
Germany	76%	24%
Greece	71%	29%
Hungary	95%	5%
Iceland	100%	
Ireland	52%	48%
Italy	71%	29%
Latvia	56%	44%
Lithuania	43%	57%
Luxembourg	100%	
Malta	100%	
Netherlands	96%	4%
Norway	100%	
Poland	51%	49%
Portugal	85%	15%
Romania	69%	31%
Slovakia	87%	13%
Slovenia	50%	50%
Spain	91%	9%
Sweden	96%	4%
United Kingdom	68%	32%

Base: n = 1668
Question Q40
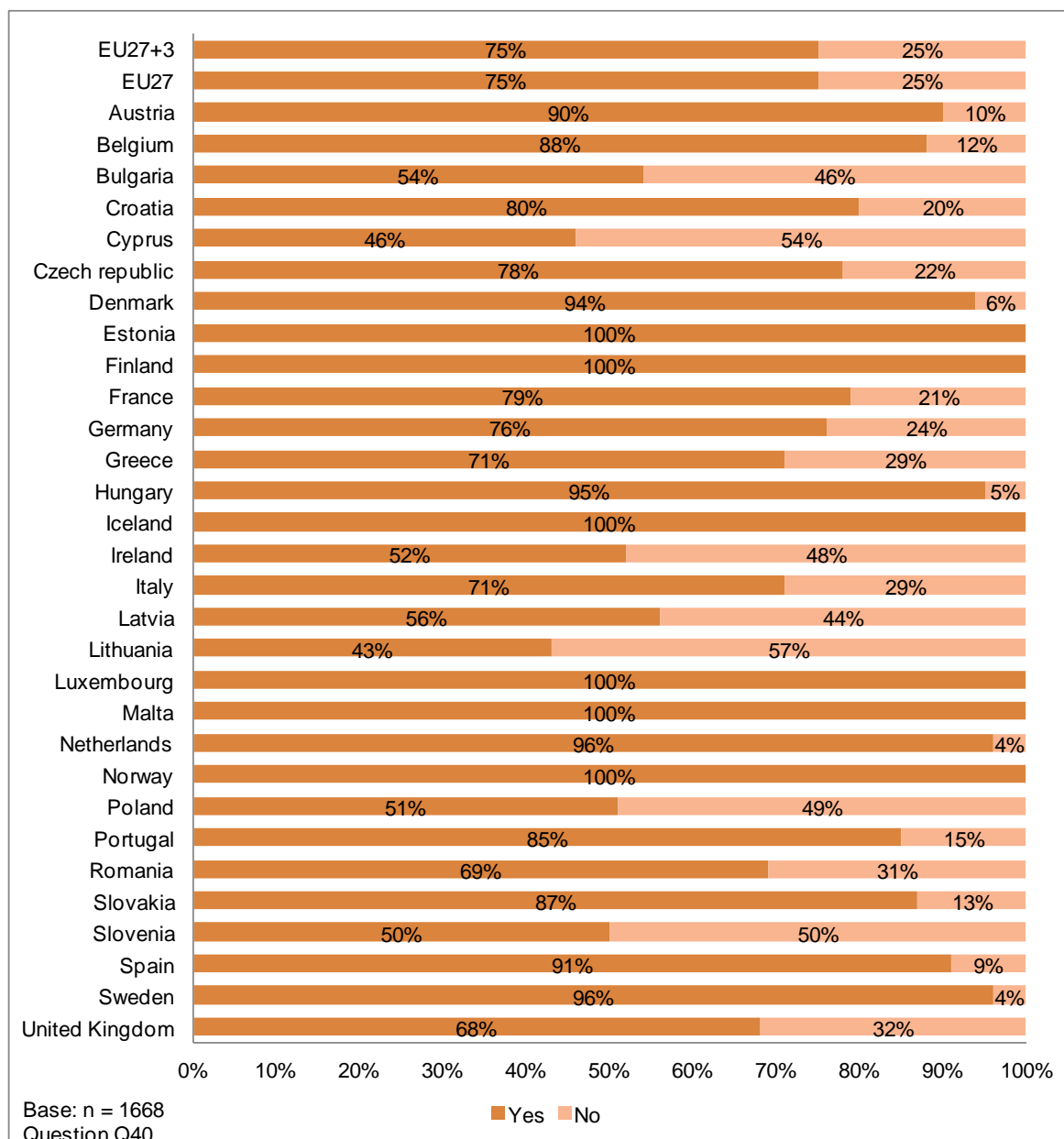
4.7.2 Information input and viewing

201 Question Q41 goes into details regarding the extent to which it is possible to input and view information through EHRs and related systems. Full implementation of all functionalities in the majority of the surveyed units is prevalent at European level, while a small share of hospitals does not implement EHRs functionalities at all. The most implemented functionalities at EU level are Lab test results (78% fully implemented), patient demographics (70%), radiology test reports (69%) and radiology test images (62%). Finance / billing information is also widely implemented with a 69% full implementation rate.

202 The lowest ratios for full implementation are for the functionality Immunizations (34%), followed by Vital Signs (42%) and Disease Management / Care Plans (42%).

Figure 74: Availability of EHRs or other ICT systems allowing health professionals to view and/or to input information, European level results

Q41. Do your EHRs or any other ICT system allow health professionals to view and/or to input the following types of information? Please indicate the extent to which they are implemented (fully implemented means it has completely replaced paper record for the function) in your hospital and the extent to which health professionals use them.

Base: n=1336 (said 1 or 3 at Q40)
Question Q41A

- Fully implemented across all units
- Fully implemented in at least 50% of units
- Fully implemented in less than 50% of units
- Not in place
- Considering implementing
- Don't know
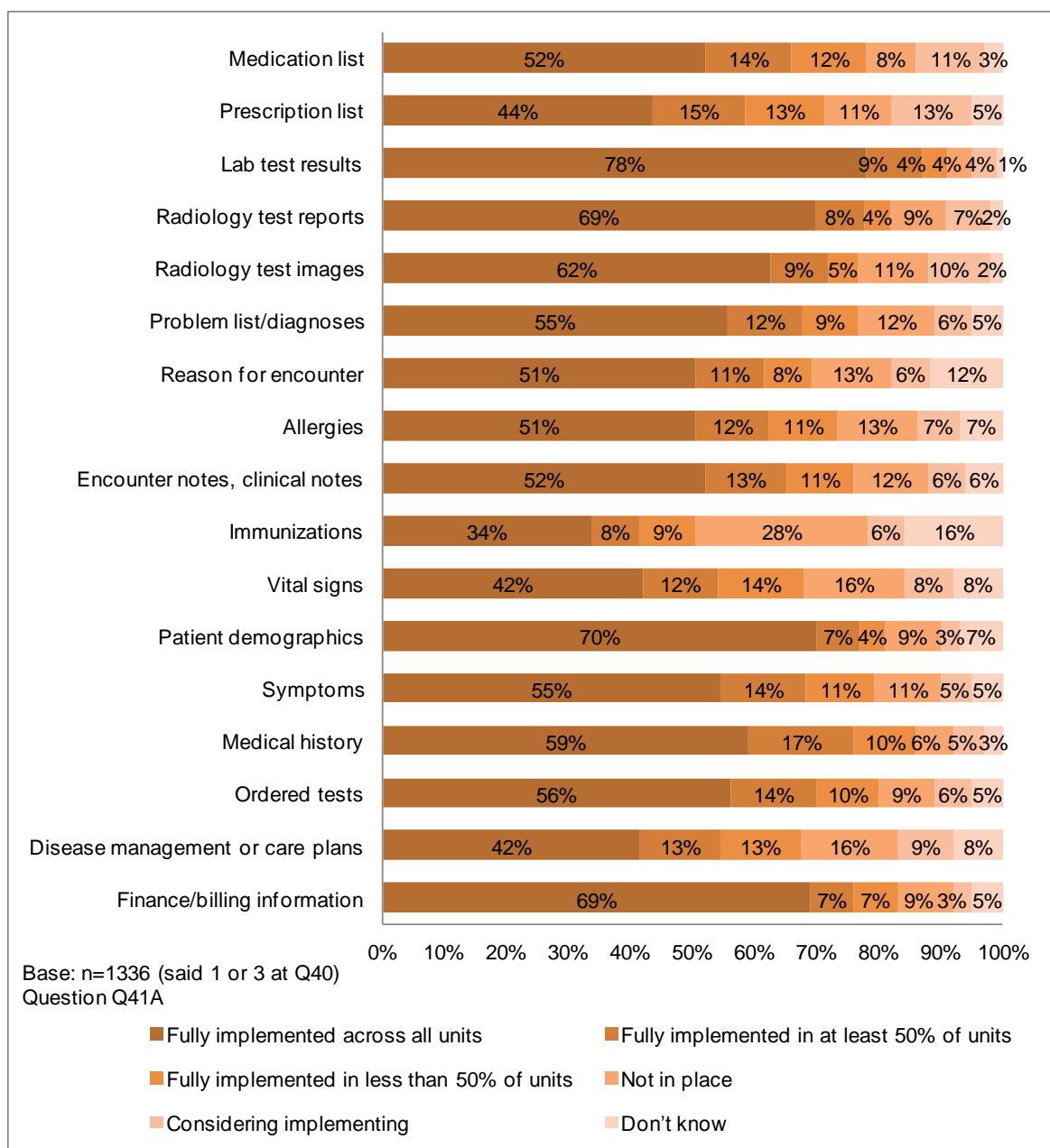
203 At country level, the countries having high full implementation rates across all functionalities are Luxembourg, Estonia, Sweden, Malta and Finland.

204 A second question regarding the usage of EHRs was addressed to respondents having implemented EHRs (in all units, in at least 50% of units or in less than 50% of units). At European level, 70% or more of the surveyed hospitals with an EHR system in place use EHRs or other ICT systems routinely (except for Immunizations at 67%). EHRs are routinely used by the surveyed hospitals for Lab test results (93%), Radiology test reports (91%) and Radiology test images (89%). The scores for no usage when EHR systems are in place are consistently low, ranging between 1% and 3%. The only notable exception is Finance/billing information, for which 9% of European hospitals with EHR systems in place do not use such system.

Figure 75: Usage of EHRs or other ICT systems allowing health professionals to view and/or to input information, European level results

Base: n=639-1081 (said 1, 2 or 3 at Q41A)
Question Q41U
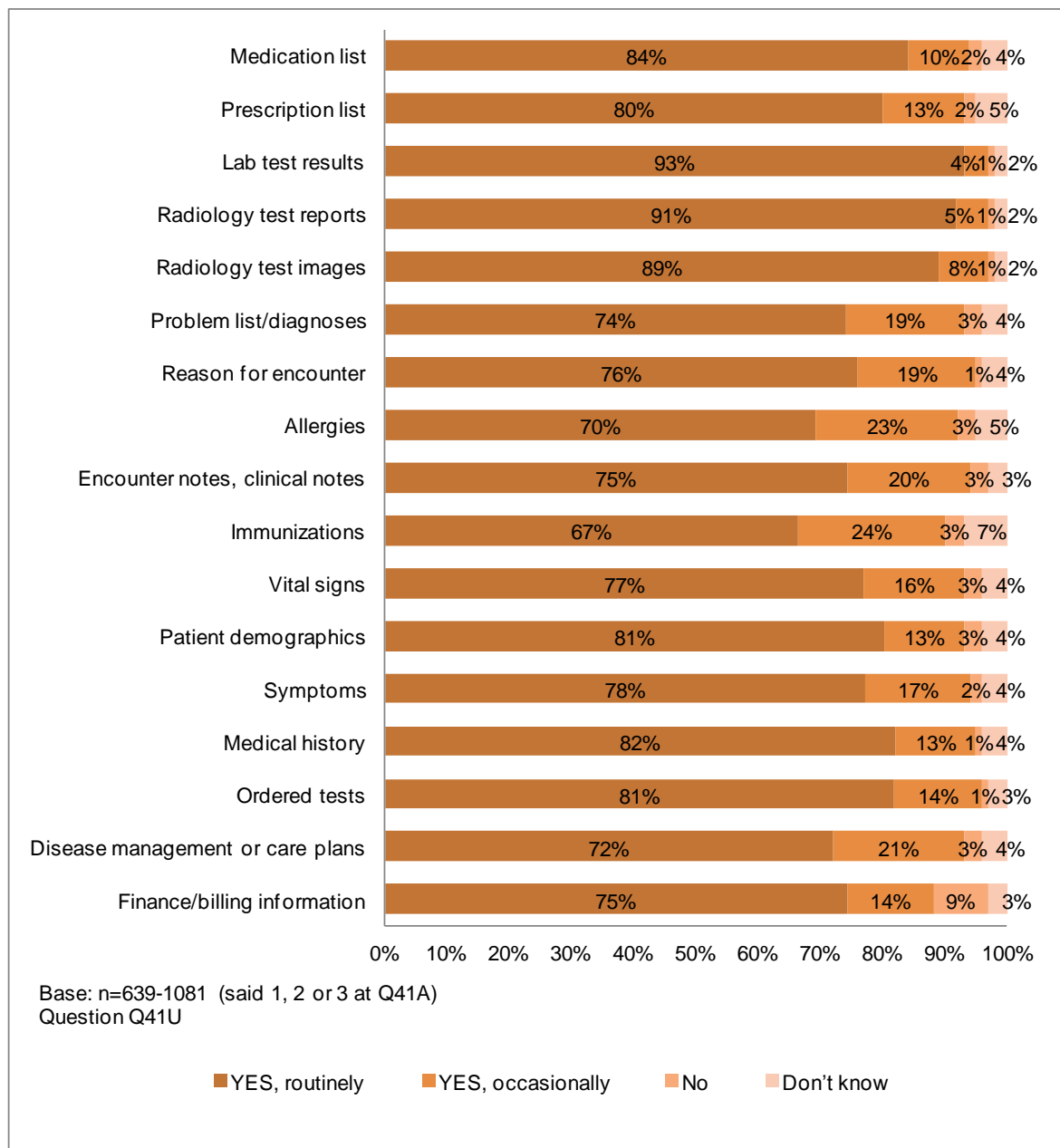
4.7.3 Clinical decision support functionalities and usage

205 As shown in Figure 76, the implementation of clinical decision support functionalities does not show a clear trend regarding the hospitals which have either implemented or not implemented these functionalities. Regarding clinical decision support, the availability in the majority of the units is similar to the distribution of the "not in place" category. In fact, Drug-drug interaction (27%), Drug-allergy alerts (28%) and Alerts to a critical laboratory value (46%) are the most broadly implemented functionalities across all units. While the latter functionality is the most available across Europe with the highest share of full implementation in the majority of the units (53%), the second functionality is characterized by the highest percentage of "Not in place" answers (28%). Despite non-implementation being relatively high (ranging from 20% to 38%), around half of the non-implementer population is considering implementation: 13%–14% for all the answer categories but one (8% in Alerts to critical laboratory value).

Figure 76: Availability of clinical decision support functionalities, European level results

Q42: Do your EHRs or any other ICT system have any of the clinical decision support functionalities listed below?

Base: n=1336 (said 1 or 3 at Q40)
Question Q42A

- ■ Fully implemented across all units
- ■ Fully implemented in at least 50% of units
- ■ Fully implemented in less than 50% of units
- ■ Not in place
- ■ Considering implementing
- ■ Don't know
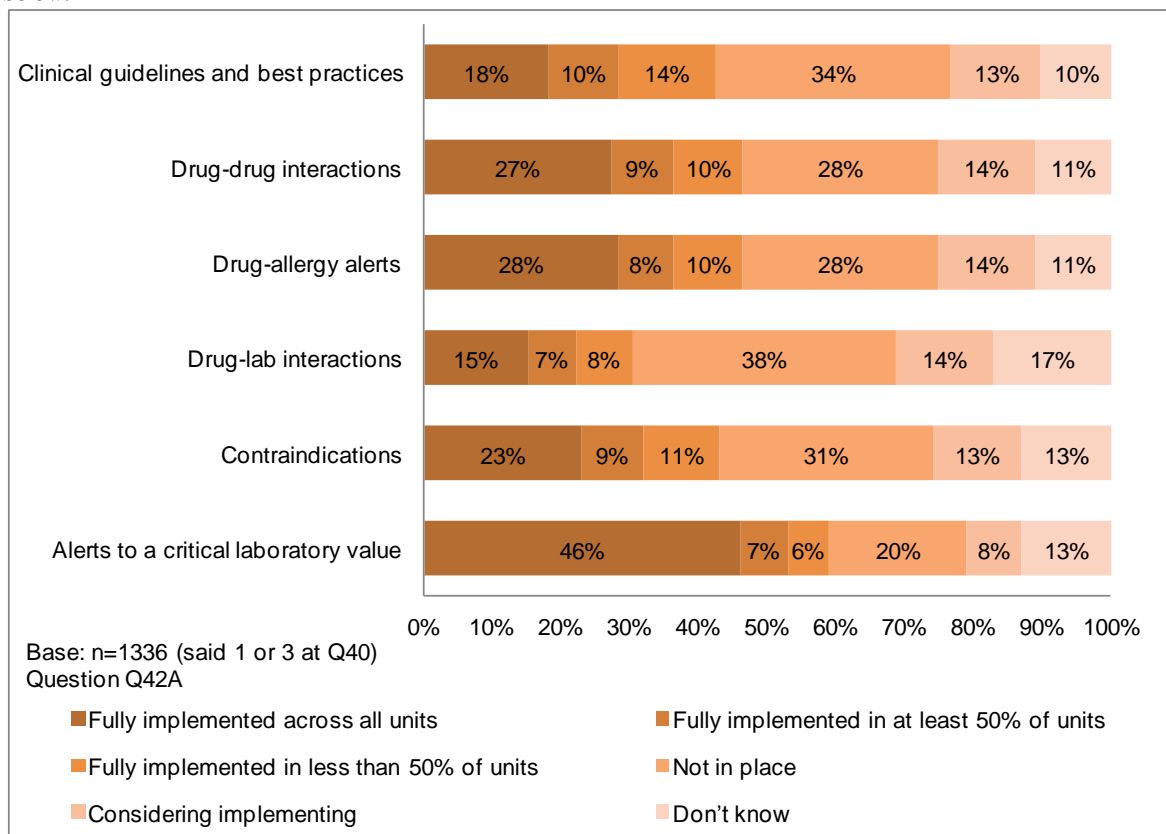
206 Looking at the national level it is possible to identify some leaders in terms of full implementation: Luxembourg and Croatia always score above the European averages for full implementation in the majority of the units. However, this observation is likely to be biased by the small number of surveyed hospitals (3 for Luxembourg and 9 for Croatia). Nonetheless, a closer look at country-level results reveals other good performers in Europe. In particular, Sweden for five functionalities, Slovenia for three, and the UK and Denmark for two functionalities, all score well above the European average in terms of full implementation. At the other side of the spectrum, Bulgaria, Romania, and to a lesser extent Lithuania, Ireland and Poland lag behind, with implementation scores for "Not in place" which are higher than the European average.

207 Among the respondents reporting at least some degree of implementation and, despite the absence of a clear trend for European-level results, the large majority of respondents stated that they use these functions either regularly or occasionally. The proportion of hospitals not using the system when already in place is very low (1% to 3%), as shown in the Figure below.

Figure 77: Usage of clinical decision support functionalities, European level results

Base: n=405-751 (said 1, 2 or 3 at Q42.1)
Question Q42U

YES, routinely   YES, occasionally   No   Don't know
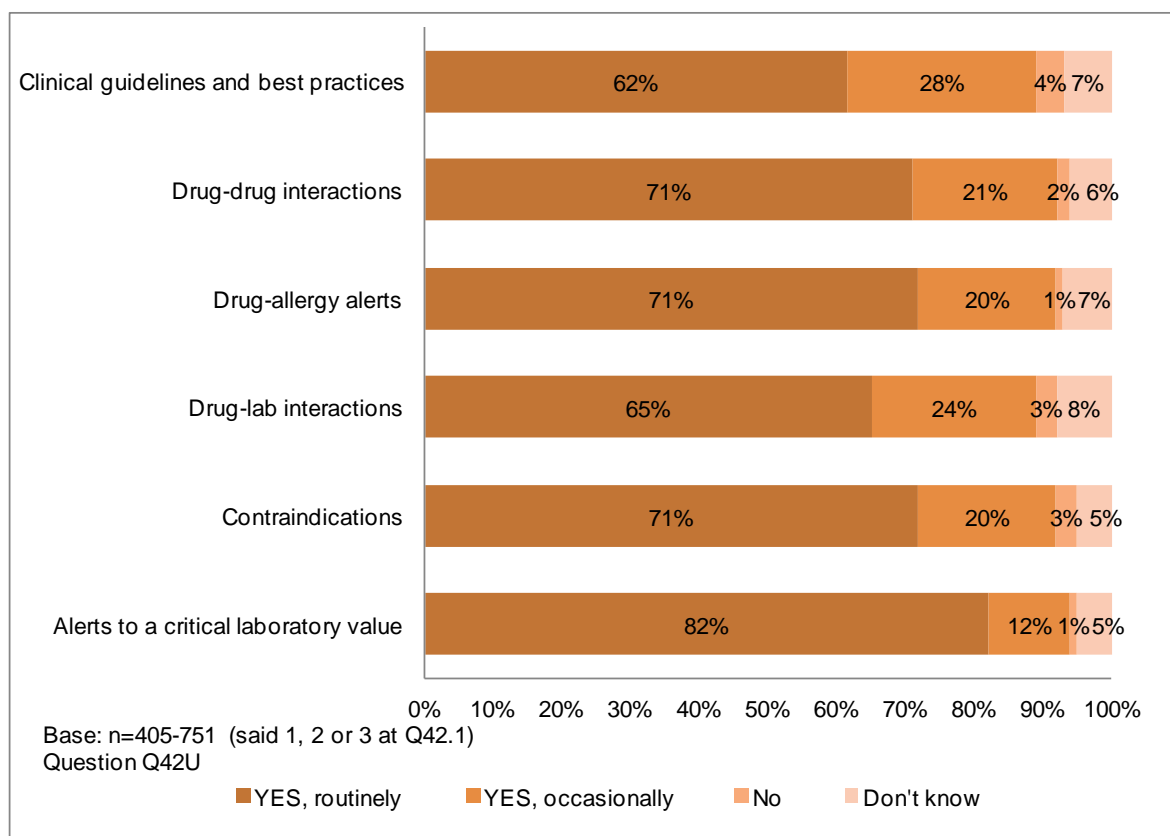
208 The score for routine usage also applies to the majority of the surveyed hospitals at national level. Some of the top performers identified for the availability part, namely Cyprus, Denmark and Luxembourg, also routinely use all of the clinical decision support functionalities in all their hospitals. In addition, Latvia, Norway and to a lesser extent Sweden and the UK routinely use the majority of the functionalities in at least 80% of their hospitals. Percentages for no usage when the system has already been put in place are almost always below 10%, except for the "*Contraindications*" functionality, reaching 33% of hospitals in Bulgaria, 17% in Croatia, 12% in Sweden and 11% in Finland.

4.7.4   Health Information Exchange availability and usage

209   Q43 deals with electronic exchange of health information enabling the transferring, sharing and accessing of this type of data by health professionals. At European level, the majority of hospitals have not implemented 7 out of 12 Health Information Exchange (HIE) functionalities. The distribution of full implementation follows a similar pattern across different HIE functionalities and mostly remains within a 20% average range. The percentage of European hospitals not exchanging medical patient data with providers in other countries is remarkably high (81%), as is the percentage of hospitals not having e-mail interactions with patients (65%) and the percentage of hospitals not certifying disabilities (63%). The only striking result regarding full implementation of HIE functionalities concerns the category Receive laboratory reports (45%). However, only 25% of the respondents have fully implemented the sending and sharing of such reports. The distribution of those considering implementing HIE features mostly ranges between 12% and 13%.

Figure 78: Availability of Health Information Exchange (HIE) systems, European level results

Q43. Health Information Exchange (HIE) is electronically transferring / sharing / enabling access to patient health information and data. Do your EHRs or any other ICT systems in place in your hospital allow health professionals to engage into any of the following forms of HIE? Please indicate the extent to which these are implemented (fully implemented means it has completely replaced paper record for the function) in your hospital and the extent to which health professionals use them.

110
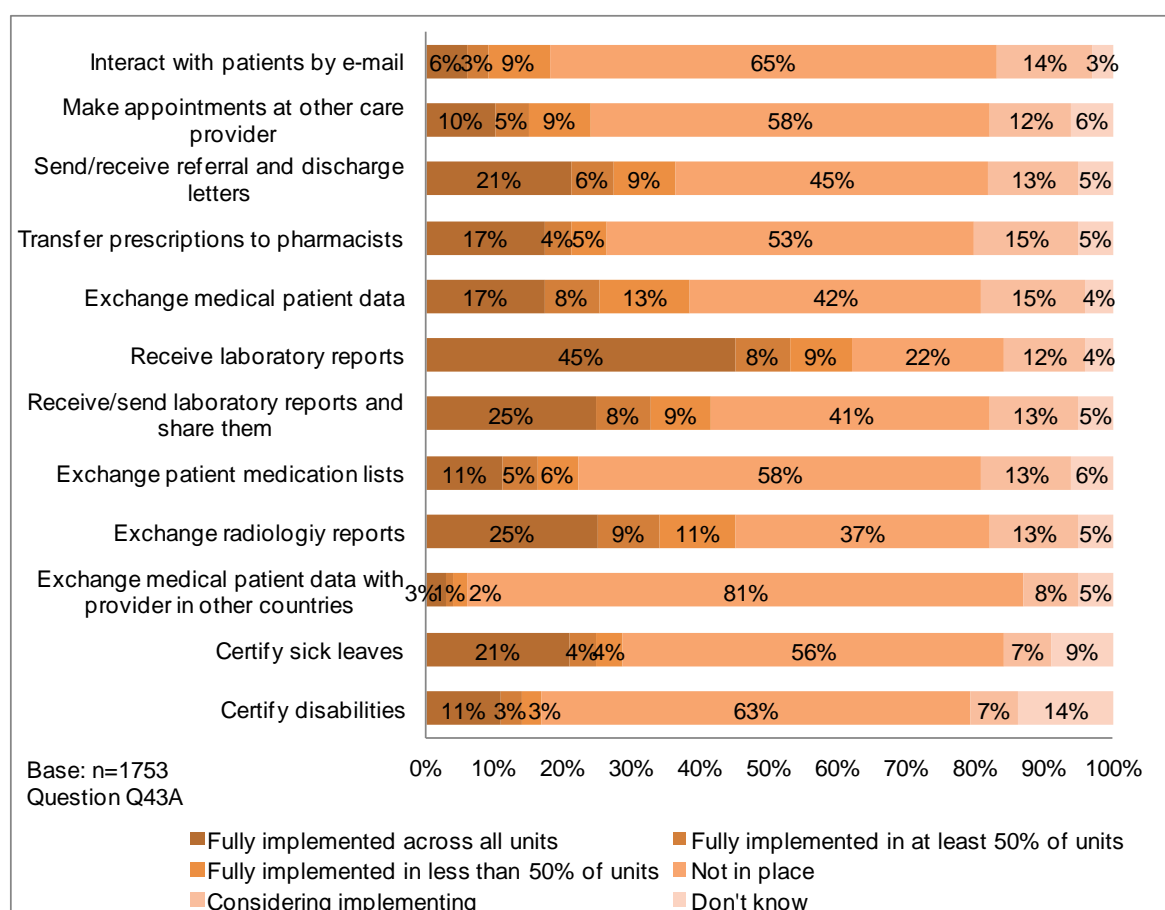
210 Looking at the results at national level, the most influential countries for full implementation are mainly composed of Nordic and Baltic countries. For all the 12 functionalities, Estonia and Iceland score above the European average and stay in the top-five list for percentages of full implementation in the majority of the hospitals. They are followed by Finland (10 out of 12), Latvia (9 out of 12) and Sweden (8 out of 12).

211 On the non-implementers side, Luxembourg, Bulgaria, Greece and Romania are among the top-five list and carry the highest shares of non-implementation; Luxembourg does not implement 10 functionalities out of 12 in the majority of its hospitals. Bulgaria, Greece and Romania follow with 6 functionalities out of 12.

212 Apart from Bulgaria, the countries that are mostly considering implementation when the functionalities are not yet in place are not the top five non-implementers. These countries considering implementation are Lithuania, Slovakia, Poland and Malta.

213 HIE usage varies across functionalities and the overall distribution seems predominantly divided between routine and occasional use, as shown in Figure 79. Routine use is at its highest score for: Receive laboratory reports (78%) followed by Transfer of prescriptions to pharmacists (71%) and Certification of sick leaves (68%). Conversely, occasional use has the highest results for Interaction with patients by e-mail (61%) and Exchange of medical patient data with providers in other countries (50%). However, the last category has also the highest percentage of No usage when the functionality is already in place. Other high percentages of No usage are in Interaction with patients by e-mail (16%) and in Making appointments with other care providers (14%).

Figure 79: Usage of Health Information Exchange (HIE) systems, European level results

Base: n=300-1112 (said 1, 2 or 3 at Q43.1)
Question Q43U
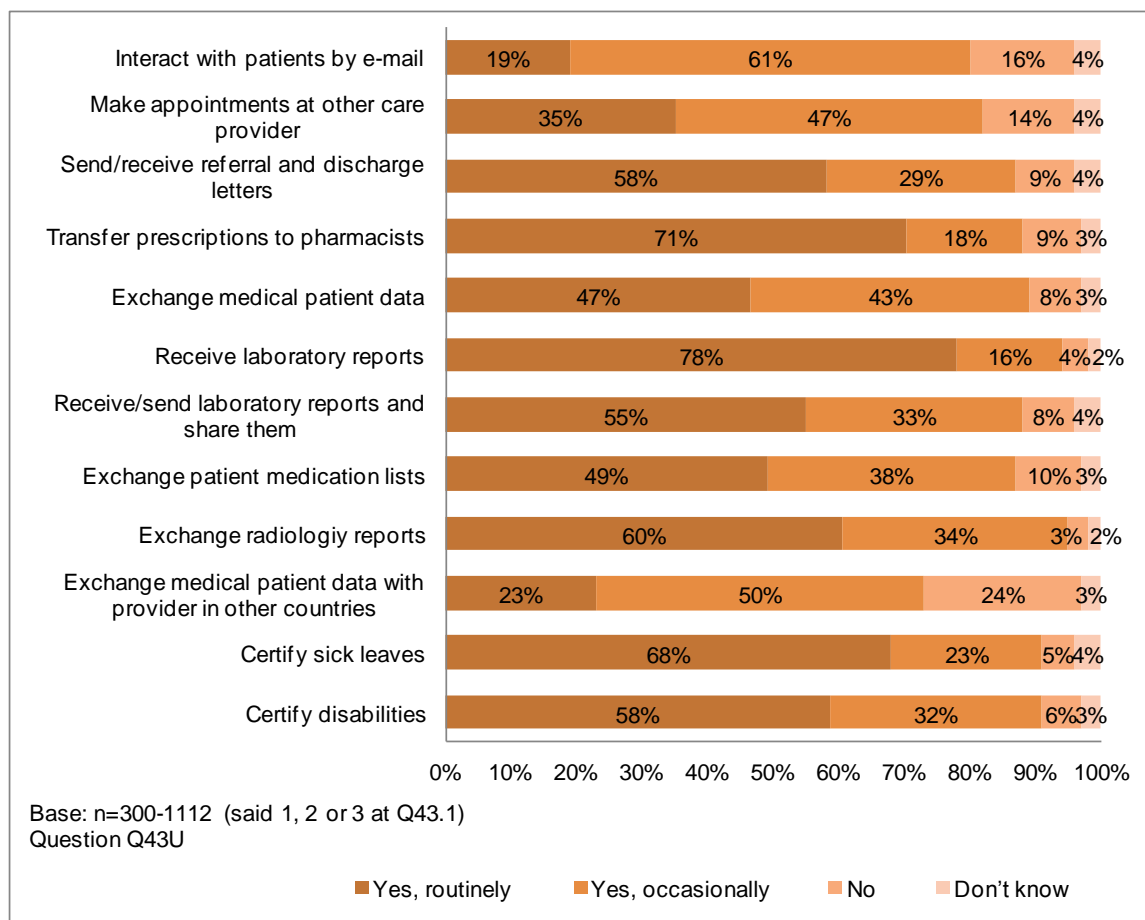
214 The picture at national level is similar to the results for availability. Nordic and Baltic countries (Denmark, Estonia, Finland and Sweden) together with Ireland and the UK account for the largest shares of routine use. In addition, Eastern European countries (Slovakia and Slovenia), but also Lithuania and Greece record the highest shares for occasional use. Even though the scores for 'no use' are relatively small compared to the ones of routine and occasional use, there are a number of countries in which the lack of use is above the European averages. These are: Bulgaria, Croatia, France, Greece, Poland and Slovakia.

4.7.5   Telehealth availability and usage

215 Telehealth enables remote delivery of health services, information and education through the use of broadband technologies. At European level, telehealth is generally not extensively implemented. Non-implementation can be observed in the majority of the surveyed hospitals for all telehealth categories. In the majority of the units, Training and Holding consultations with other healthcare practitioners scores 12% and 13% respectively. Diverging from other statistics in this section, the implementation level is less than 50%, reaching 31% in Holding Consultations with other healthcare practitioners. Regarding telehealth services with patients, the non-implementation rate is high, reaching 69% for Holding consultations with patients and 76% for Remote monitoring of patients. Among the hospitals not implementing these functionalities, the percentage of those considering implementation is around 12% in all categories.

Figure 80: Availability of Telehealth systems, European level results

Q44. This is a question about "telehealth" which is the use of broadband-enabled information and communication technology to deliver health services, medical education, and health education remotely. It includes both clinical elements of the health care system such as remote consultations with patients and remote monitoring of their vital signs and health status, and non-clinical elements such as distance training.

Please indicate the extent to which these are implemented (fully implemented means it has completely replaced paper record for the function) in your hospital and the extent to which health professionals use them.
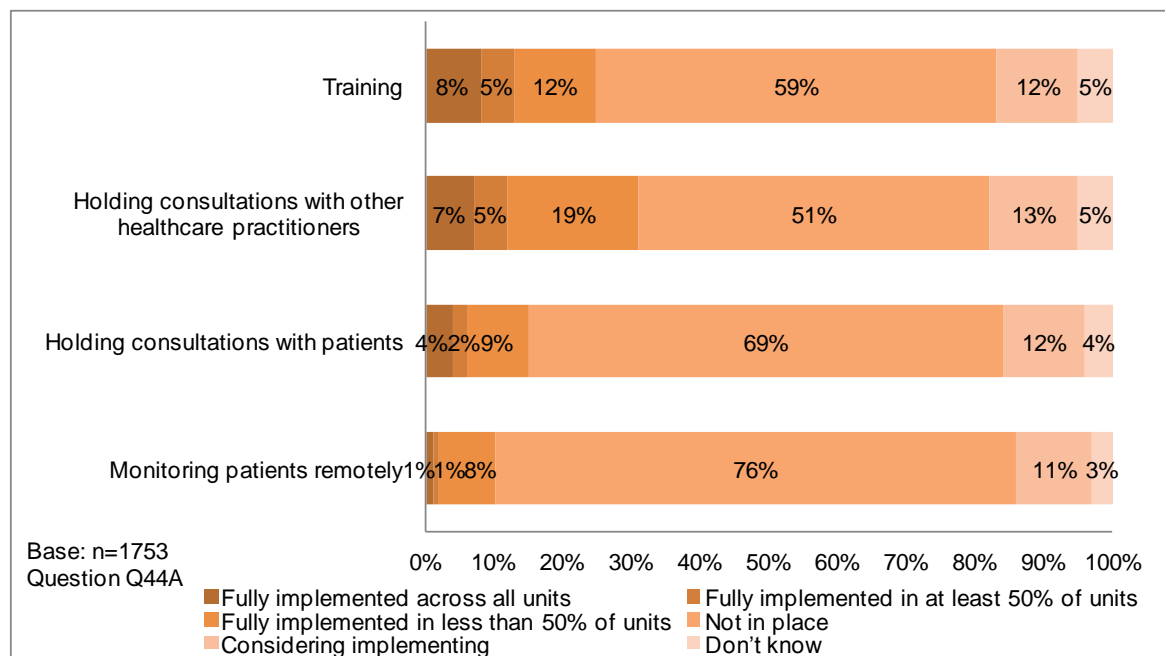
216 At national level, the countries engaged in full implementation are Latvia and the Netherlands, who are leaders in terms of full implementation of all the reported functionalities across their hospitals. Croatia, Denmark and Estonia are also top-listed for 3 functionalities out of 4. Conversely, the countries that are behind in implementation are the Czech Republic (top-listed for all the functionalities), Hungary and Slovenia (top-listed for 3 functionalities out of 4).

217 Even though the implementation is not extensive at European level, when Telehealth is implemented, it is also widely used. Routine use ranges between 30% and 39%. Occasional use is the most developed usage category for all the functions and ranges between 53% and 60%. Holding consultations with patients has an 11% score for no usage even though the system is already in place.

218 Missing data characterizes the country level picture for usage. Only Bulgaria, the United Kingdom and the Netherlands are top-listed for the routine use of more than one functionality, while Hungary is the only country above the European averages for 3 categories out of four.

Figure 81: Usage of Telehealth systems, European level results

Base: n=172-548 (said 1, 2 or 3 at Q44A)
Question Q44U

■ YES, routinely   ■ YES, occasionally   ■ No   ■ Don't know
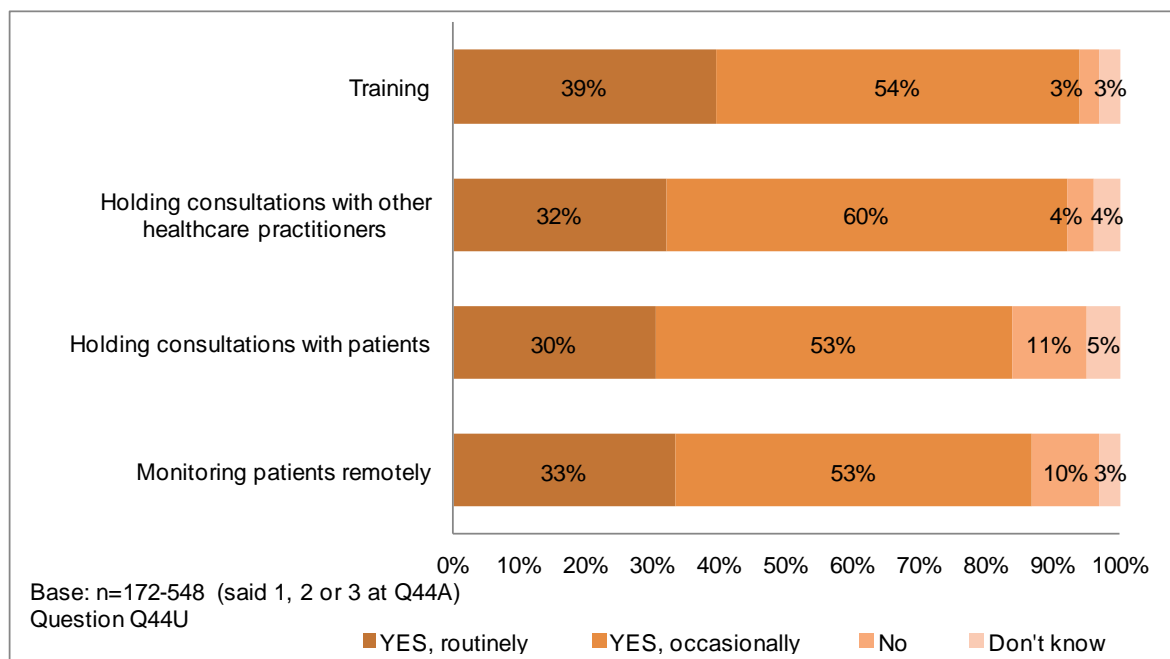
4.7.6   Transition from paper-based to fully electronic systems

219   The last question deals with the hospital's position in the transition from a paper-based system to a fully electronic system. At European level, there is a clear prevalence of a hybrid model: On a maturity scale going from 1 (totally paper-based) to 9 (totally electronic), 41% of hospitals gave a score of 5 for IT implementation.

Figure 82: Position of the hospital in the transition from paper-based systems to a fully electronic system, European level results

Q45. The implementation of IT systems within the hospitals allows the transition from paper-based systems to a fully electronically-based system. Please select what is the position of your hospital in this transition.

Base: n = 1753
Question Q45
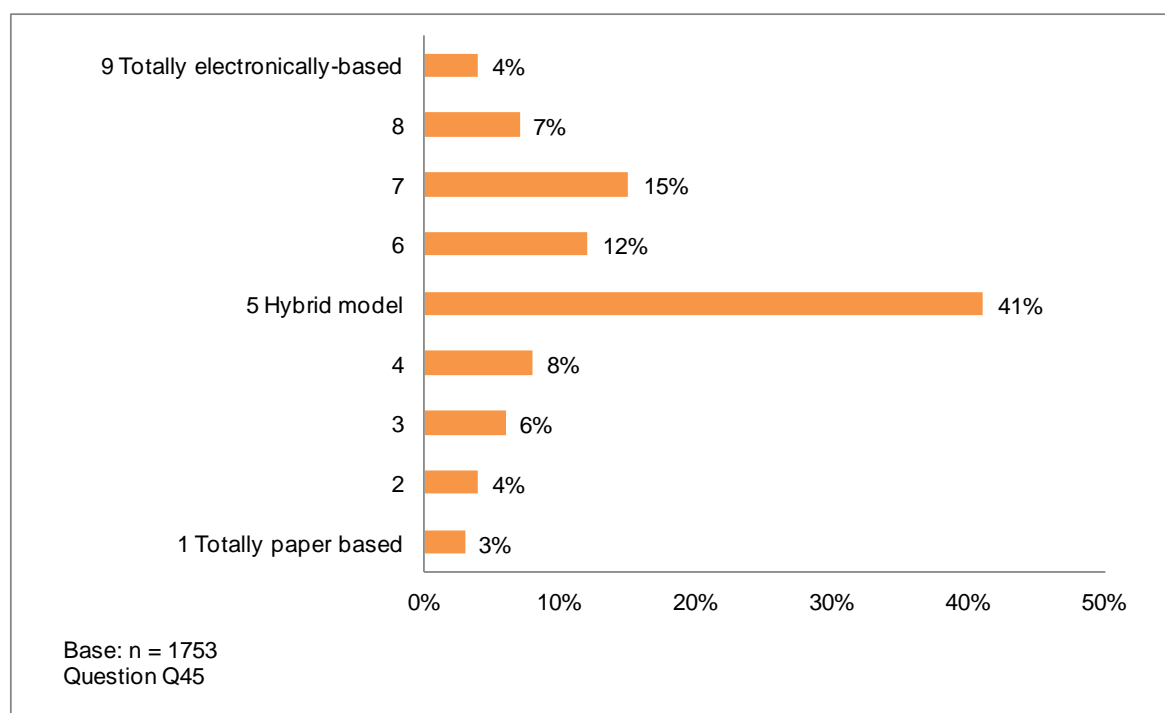
220   The European trend toward the adoption of a hybrid system is also mirrored by national level results. The best performers in terms of IT implementation are Sweden (average score 7.58) and Luxembourg (average score 7.00). They are followed by Finland (6.73), the Netherlands (6.65) and Spain (6.53).

114

Figure 83: Position of the hospital in the transition from paper-based systems to a fully electronic system, Country-level results

Q45. The implementation of IT systems within the hospitals allows the transition from paper-based systems to a fully electronically-based system. Please select what is the position of your hospital in this transition.

From paper- to electronically-based	1 Totally paper based	2	3	4	5 Hybrid model	6	7	8	9 Totally electronically-based
EU27+3	3%	4%	6%	8%	41%	12%	15%	7%	4%
EU27	3%	4%	6%	8%	40%	13%	15%	7%	4%
Austria			5%	7%	26%	14%	26%	14%	9%
Belgium				6%	36%	22%	24%	8%	4%
Bulgaria		6%	10%	11%	40%	10%	15%	5%	3%
Croatia		9%			64%				27%
Cyprus		15%	15%	8%	23%	23%	15%		
Czech republic	2%	2%	8%	12%	40%	8%	15%	8%	5%
Denmark					44%	19%	12%	12%	12%
Estonia					17%	25%	58%		
Finland		4%		4%	19%	8%	19%	42%	4%
France	2%	2%	7%	9%	41%	16%	16%	6%	1%
Germany	3%	4%	7%	8%	48%	15%	10%	3%	1%
Greece	3%	0%	10%	10%	28%	15%	22%	6%	4%
Hungary		2%	5%	12%	37%	7%	12%	19%	7%
Iceland				11%	22%		44%	22%	
Ireland	4%	17%	26%	17%	22%		4%	9%	
Italy	3%	3%	7%	7%	48%	13%	14%	3%	3%
Latvia	5%	11%	5%	11%	53%		11%	5%	
Lithuania	12%		6%	12%	59%	3%	3%	3%	
Luxembourg						33%	33%	33%	
Malta					100%				
Netherlands					31%	15%	23%	19%	12%
Norway					50%	17%		17%	17%
Poland	17%	6%	5%	10%	45%	8%	5%	1%	2%
Portugal		2%			34%	24%	27%	10%	2%
Romania	2%	1%	1%	8%	60%	9%	11%	1%	6%
Slovakia				6%	58%	12%	15%	6%	3%
Slovenia	17%	17%			67%				
Spain		1%	4%	3%	23%	13%	27%	17%	12%
Sweden					12%		38%	19%	31%
United Kingdom		33%	6%	14%	35%	6%	4%		1%

221 Comparisons between hospitals according to their ownership does not show any real difference as regards the implementation of IT systems, since results are very similar for both public and private hospitals. Private not for profit hospitals perform similarly, but are slightly more advanced in the transition to fully electronic systems, as they scored an average 5.69 on a 1 to 10 scale, while Private and Public hospitals scored 5.31 and 5.34 respectively.

Figure 84: Position of the hospital in the transition from paper-based systems to a fully electronic system, results by ownership

Question Q45

■ Total (n=1716) ■ Public (n=1208) ■ Private (n=340) ■ Private not for profit (n=168)

222   Results by size do not show significant differences between hospitals in the transition to an electronic system. Small hospitals with fewer than 101 beds appear to be less advanced in this transition, registering an average score 4.85 on a 1 to 10 scale, compared to 5.35, 5.48 and 5.55 for the other categories of hospitals, in increasing order of size.

Figure 85: Position of the hospital in the transition from paper-based systems to a fully electronic system, results by size

Question Q45

Legend:
- Total (n=1685)
- Fewer than 101 beds (n=331)
- Between 101 and 250 beds (n=513)
- Between 251 and 750 beds (n=599)
- More than 750 beds (n=242)
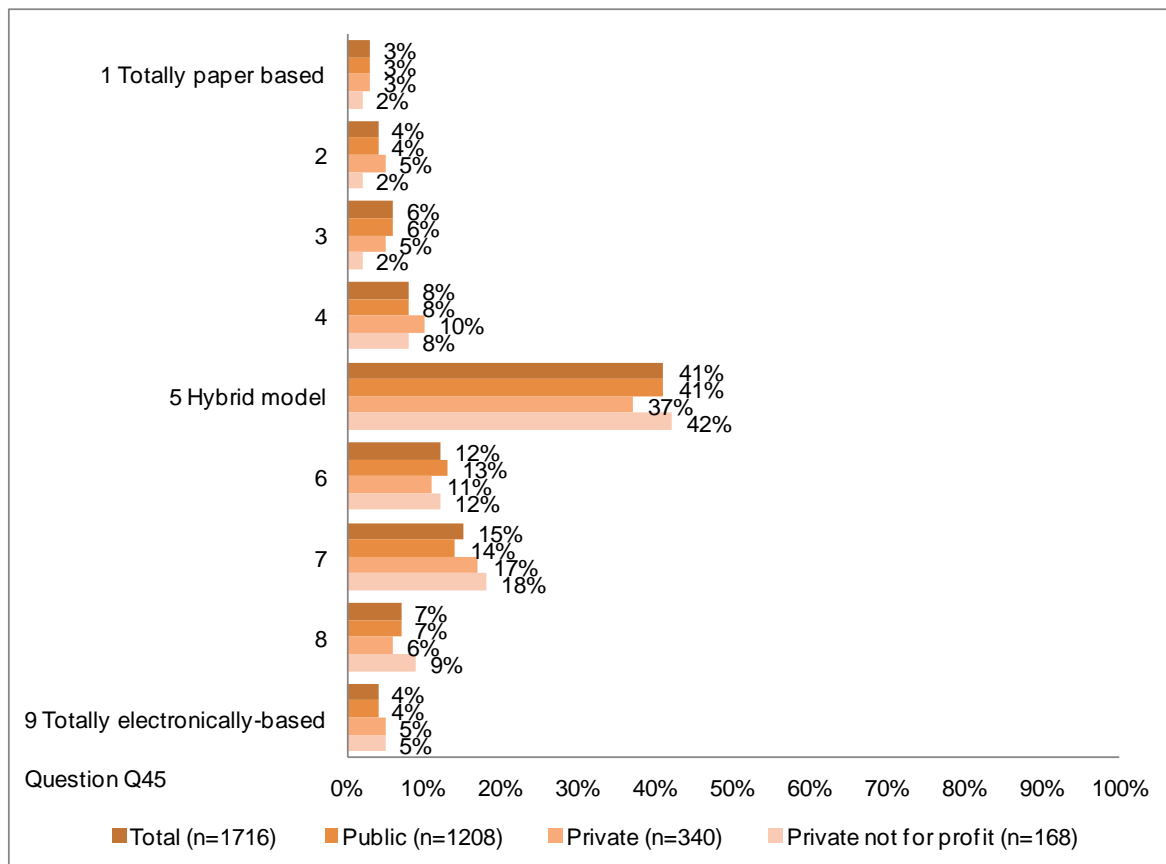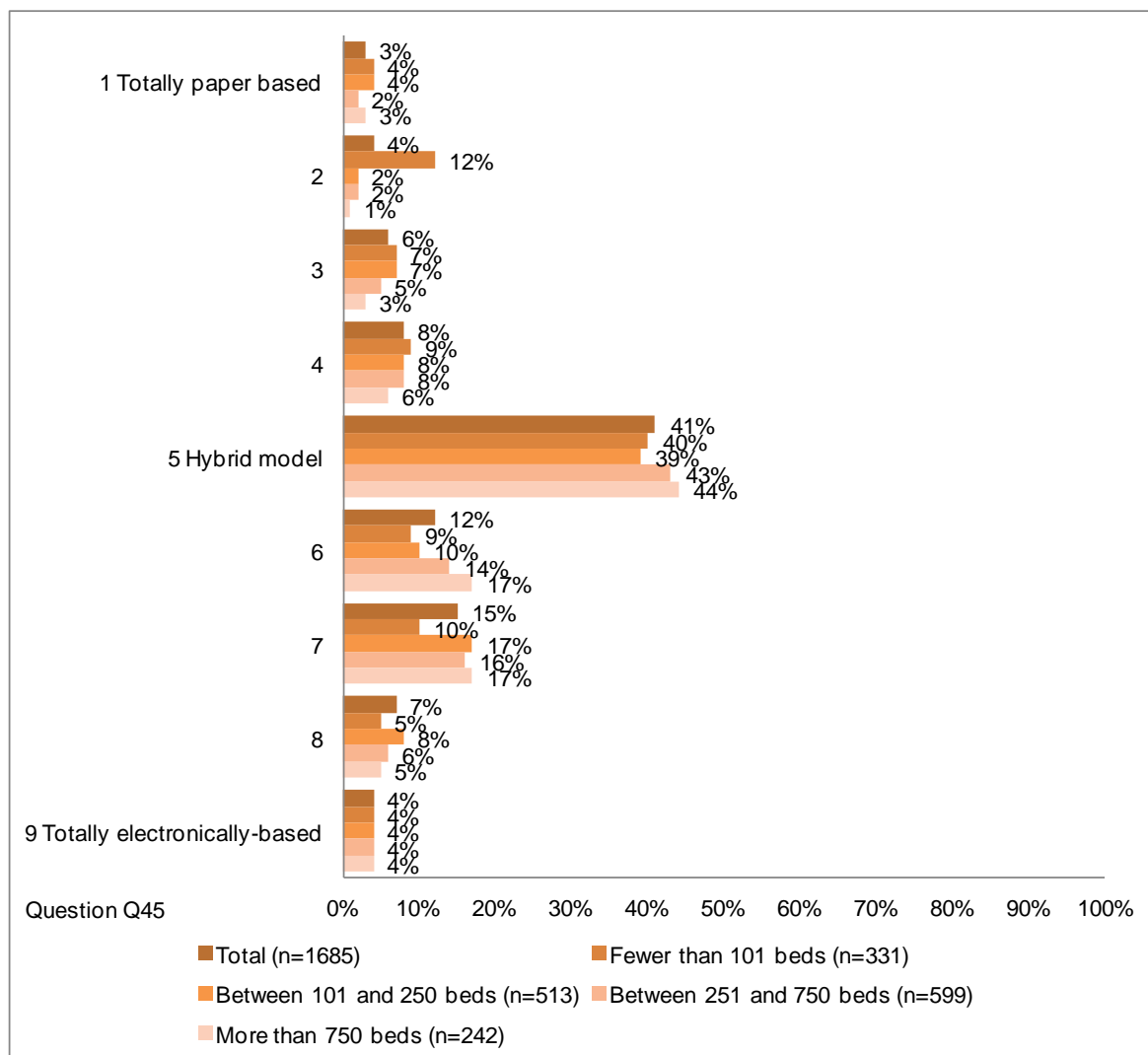
5 Results at national and regional level

5.1 Method of analysis

5.1.1 Creation of the eHealth indicators

223 Based on the eHealth Benchmarking III study, country profiles have been built using 13 eHealth indicators. These eHealth indicators consist in specific answers to the questionnaire and identify the eHealth best practices in Europe. For consistency reasons, the eHealth indicators are identical to the ones that were used in the previous survey. They cover the following areas:

- **Infrastructure:** three eHealth indicators are used to identify pre-requisites towards "ubiquitous eHealth systems". These systems enable remote patient monitoring and health information exchange beyond hospital boundaries. The three indicators used are:
  - *Externally connected*: access to the infrastructure outside the hospital-specific site is important. Extranet systems, value-added networks and proprietary infrastructures enable inter-connectivity between healthcare stakeholders and hence ensure a high level of health care;
  - *Broadband > 50Mbps*: a high-speed broadband was one of the most important policy priorities within the European Commission's Digital Agenda for Europe. It also enables the processing and transfer of an increasing amount of data, such as images, reports, telemonitoring services;
  - *Single and unified wireless*: such infrastructure allows mobile access to different applications and services in every location of the hospital.

- **Applications:** a selection of five medical applications was made. These include:
  - *Single EPR shared by all departments*: a unique file where patient clinical information is stored, managed, viewed, completed and shared everywhere in the hospital constitutes an important tool for the improvement of quality of care and patient safety;
  - *PACS usage*: by enabling digital transmission and management of images, PACS facilitates quick and access to images and reports, reduces the number of duplicate images, and easy acquisition of a chronological view of the patient's radiology history;
  - *ePrescribing*: the implementation of such system is crucial to avoid prescription duplicates and errors;
  - *Integrated system for eReferral*: such system avoids faxes or letter losses and overlooked communications between two medical directors;
  - *Tele-monitoring*: with the use of ICT for patients outside the hospital premises, healthcare professionals can more effectively manage patient health and prevent exacerbations and complications which may lead to re-hospitalisations. These services are particularly useful for patients living with chronic illnesses or elderly patients.

- **Integration:** this area reflects the ability of the hospital to communicate with healthcare stakeholders that are outside the hospital. Hence, it directly impacts the health professional's work. As such, interoperability of eHealth applications is a key, especially in Europe where the notion of cross-border healthcare has become increasingly important. As a result, three eHealth indicators have been chosen:
  - *Exchange of clinical care information with external providers*;
  - *Exchange of laboratory results with external providers*;
  - *Exchange of radiology reports with external providers*.

- **Security:** ensuring security and privacy of data is required to build trust between the medical staff, the patient, and the other stakeholders who may need patient clinical information. If risks are perceived or information is not accurate or partially complete, patients or physicians may not be willing to disclose necessary health information, which could be life-threatening. Two indicators have been selected to reflect the level of security in acute care hospitals:
  - *Clear and structured rules on access to clinical data*: to ensure privacy of data, access to certain types of data must be restricted to some specific healthcare professionals;

− *EAS for disaster recovery in less than 24 hours*: an EAS (Enterprise Archiving Strategy) enables users to restore clinical information facilities and information when necessary. This indicator reflects the hospital robustness to provide the services to ensure continuity of performance.

224 To build the eHealth indicators, we have relied on the most important questions of the survey. Table 4 presents these questions and answer options used to define the eHealth indicators and assess the implementation of eHealth in European acute care hospitals.

Table 4: Question items used for the eHealth indicators

eHealth indicator	Question used	Answer option used
Externally connected	Q18. Is your hospital computer system externally connected…?	• At least one of the two following answers: − Q18.1. Yes, through an extranet i.e. using a secure Internet connection over the Internet − Q18.2. Yes, through a value-added network or proprietary infrastructure
Broadband > 50Mbps	Q19. What type of Internet connection does your hospital have?	• Q18.4. Broadband (from 50 Mbps to 100Mbps) • Q18.5. Broadband (above 100 Mbps)
Single and unified wireless	Q20. How does your hospital support wireless communications?	Q20.1. There is a single, unified wireless infrastructure capable of supporting most of the applications
Single EPR shared by all departments	Q23. Which type of EMRs / EHRs / EPRs does your hospital mainly use?	Q23.1. A hospital-wide EMR/EHR/EPR shared by all the clinical service departments
PACS usage	Q25. Does the hospital use a Picture Archiving and Communication System (PACS)?	Q25.1. Yes
ePrescribing	Q26. Which of the following computerised systems has the hospital integrated?	Q26.5. A computerized system for ePrescribing
Integrated system for eReferral	Q26. Which of the following computerised systems has the hospital integrated?	Q26.2. An integrated system to send or receive electronic referral letters
Tele-monitoring	Q27. Does the hospital have the following computer-based system or applications	Q27.5. Tele-homecare / tele-monitoring services to outpatients (at home)?
Exchange of clinical care information with external providers	Q28. Does your hospital exchange electronically clinical care information about patients (for instance, clinical history or results from medical tests) with any of the following providers?	• Q28.1. With a hospital or hospitals outside your own hospital system • Q28.2. External general practitioners • Q28.3. External specialists • Q28.4. Health care providers in other EU countries • Q28.5. Health care providers outside the EU countries • Q28.6. Other: please specify

eHealth indicator	Question used	Answer option used
Exchange of laboratory results with external providers	Q29. Does your hospital exchange electronically laboratory results information about patients with any of the following providers?	• Q29.1. With a hospital or hospitals outside your own hospital system • Q29.2. External general practitioners • Q29.3. External specialists • Q29.4. Health care providers in other EU countries • Q29.5. Health care providers outside the EU countries • Q29.6. Other: please specify
Exchange of radiology reports with external providers	Q31. Does your hospital exchange electronically radiology images and reports about patients with any of the following providers?	• Q30.1. With a hospital or hospitals outside your own hospital system • Q30.2. External general practitioners • Q30.3. External specialists • Q30.4. Health care providers in other EU countries • Q30.5. Health care providers outside the EU countries • Q30.6. Other: please specify
Clear and structured rules on access to clinical data	Q37. Are there clear structured rules on accessing (reading-writing) patients' electronic medical data?	• Q37.1. Yes
EAS for disaster recovery in less than 24 hours	Q39. Please estimate how quickly your organisation can restore critical clinical information system operations if a disaster causes the complete loss of data at your hospital's primary data centre.	• Q39.1. Immediate (we have a fully redundant data centre) • Q39.2. Less than 24 hours

5.1.2   Representation and analysis of the eHealth indicators

225   Spider diagrams were used to represent the country eHealth profiles. These diagrams have scores ranging from 0 to 5, which correspond to an implementation rate of between 0% and 100%.

226   The spider diagrams are composed of three lines:

- The brown solid line corresponds to the country 2012 average score for each indicator;
- The orange solid line corresponds to the country 2010 average score for each indicator. This line provides a standard basis for comparison with the 2012 score and hence to represent the changes over time;
- The brown dashed line corresponds to the EU27+3 average score for 2012. It indicates the situation of the country compared to the EU27+3 averages. The same line is repeated on each country spider diagram.

227   For each country, a text describes the spider diagram. It summarises the situation of the country regarding to the EU27+3 average and the changes observed between 2010 and 2012.

228   The questions used for the 13 indicators as well as the correspondence with 2010 survey are shown in Table 5.

Table 5: Source questions for the eHealth profile composite indicators

Indicator	2010 Study	Answers 2010	Base 2010	2012 Study	Answers 2012	Base 2012
Externally connected	Q8	answer 1 and 2	total-"don't know" at Q7	Q18	count if at least one of answer 1 and 2	total-"don't know" at Q17
Broadband > 50Mbps	Q10	answer 3 and 4	total-"don't know" at Q10	Q19	answer 4 and 5	total-"don't know" at Q19
Single and unified wireless	Q11	answer 1	total-"don't know" at Q10	Q20	answer 1	total-"don't know" at Q20
Single EPR shared by all departments	Q16	answer 1	total-"don't know" at Q16	Q23	answer 1	total-"don't know" at Q23
PACS usage	Q20	answer 1	total-"don't know" at Q20	Q25	answer 1	total-"don't know" at Q25
ePrescribing	Q23	answer 5	total-"don't know" at Q23	Q26.5	answer 5	total-"don't know" at Q26
Integrated system for eReferral	Q23	answer 2	total-"don't know" at Q23	Q26.2	answer 2	total-"don't know" at Q26
Tele-monitoring	Q30	answer 1	total-"don't know" at Q30	Q27.5	answer 1	total-"don't know" at Q27
Exchange of clinical care information with external providers	Q34	total-none-"don't know" at Q34	total-"don't know" at Q34	Q28	total-none-"don't know" at Q28	total-"don't know" at Q28
Exchange of laboratory results with external providers	Q35	total-none-"don't know" at Q35	total-"don't know" at Q35	Q29	total-none-"don't know" at Q29	total-"don't know" at Q29
Exchange of radiology reports with external providers	Q37	total-none-"don't know" at Q37	total-"don't know" at Q37	Q31	total-none-"don't know" at Q31	total-"don't know" at Q31
Clear and structured rules on access to clinical data	Q41	answer 1	total-"don't know" at Q41	Q37	answer 1	total-"don't know" at Q37
EAS for disaster recovery in less than 24 hours	Q46	answer 1 and 2	total-"don't know" at Q44	Q39	answer 1 and 2 and said "yes" at Q38(*)	total-"don't know" at Q38

(*) Note: In 2010, this question was only asked if respondent said "yes" at Q44. We have used the same filter this year to guarantee comparability of the data over the years.

5.1.3 NUTS analysis

229   A regional analysis for selected countries has been done in order to show the disparities between regional and the national performances in a number of composite indicators presented above. This regional analysis was done at NUTS 1 or NUTS 2 level(s).

230   No regional analysis has been carried out for the countries which are not part of the EU and for those countries where there is only one or no NUTS 1. In this case, only a national analysis was performed. An analysis at NUTS 1 or NUTS 2 level was performed only where data analysis could reveal statistically significant results at the specific NUTS level. The table below presents the countries where a NUTS level has been selected for analysis.

Table 6: NUTS Level of analysis per country

Country	Level of analysis
Germany	NUTS 1
Denmark	NUTS 2
Italy	NUTS 2
Portugal	NUTS 2
Spain	NUTS 2
United Kingdom	NUTS 1

5.2 Results at national level

5.2.1 Austria's acute hospital eHealth profile

231 242 hospitals were identified in Austria. Within this sample, 201 (83%) completed the screener part of the questionnaire and of these, 55% qualified as acute care hospitals. Of the 132 screened in, 43 acute hospitals (33%) completed the survey. The number of medium-sized hospitals in Austria has increased significantly between 2010 and 2012.

Table 7: Austrian breakdown by size of hospital

Austria	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	132	9	60	46	14	3
		7%	45%	35%	11%	2%
2012	43	2	21	16	4	-
		5%	49%	37%	9%	-
2010	15	1	9	5	-	-
		7%	60%	33%	-	-

The number of hospitals has increased by a factor of two or more in all ownership categories between 2010 and 2012.

Table 8: Austrian breakdown by ownership type

Austria	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	132	55	25	35	17
		42%	19%	27%	13%
2012	43	20	7	14	2
		47%	16%	33%	5%
2010	15	10	2	3	-
		67%	13%	20%	-

Figure 86: Austrian acute hospital eHealth profile
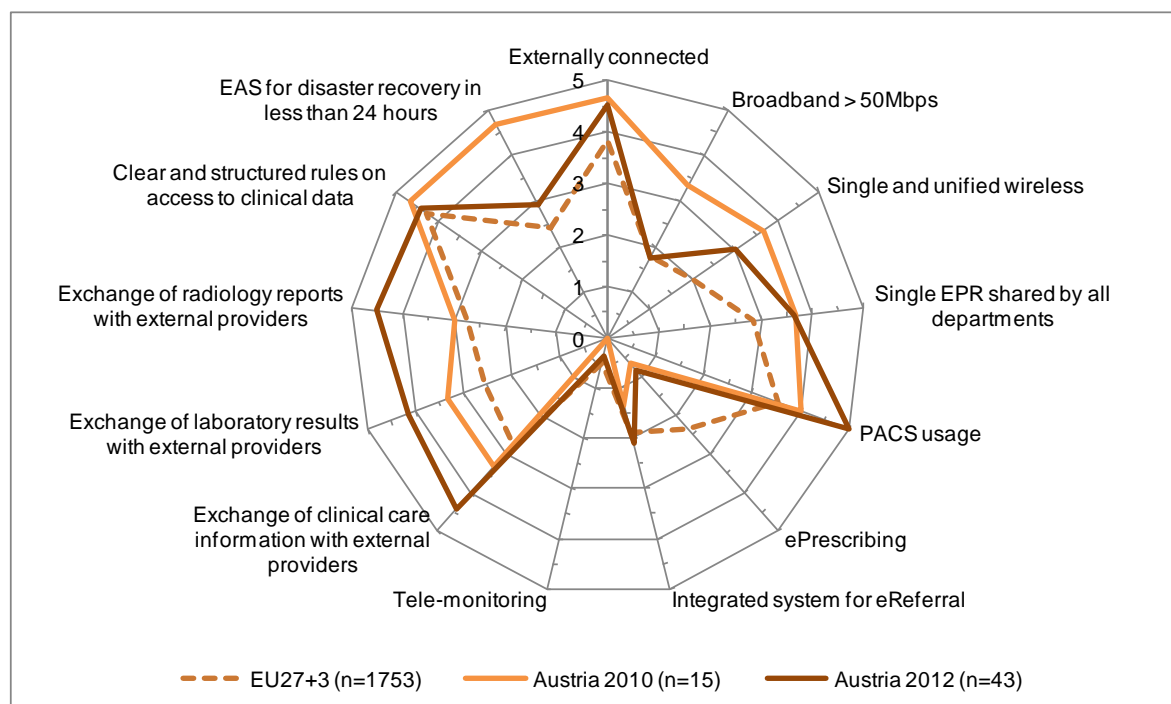
eHealth indicators - Austria	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	14%	-3%
Broadband > 50Mbps	-1%	-32%
Single and unified wireless	20%	-13%
Single EPR shared by all departments	16%	0%
PACS usage	29%	20%
ePrescribing	-30%	3%
Integrated system for eReferral	4%	15%
Tele-monitoring	-3%	7%
Exchange of clinical care information with external providers	33%	22%
Exchange of laboratory results with external providers	32%	16%
Exchange of radiology reports with external providers	36%	31%
Clear and structured rules on access to clinical data	3%	-5%
EAS for disaster recovery in less than 24 hours	10%	-35%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Austrian eHealth profile within EU27+3

232 Austria noticeably outperforms the average EU27+3 eHealth profile in four main areas. These are "Exchange of radiology reports with external providers", "Exchange of laboratory results with external providers", "Exchange of clinical care information with external providers" and "PACS usage". Each of these areas outperforms the EU average by a range of between 32% and 36%. In most other areas, Austria more or less matches the European average, with the exception of "ePrescribing", where the country appears to be a significant underperformer (-30%), suggesting room for improvement.

Changes in the Austrian eHealth profile

233   Since 2010, Austria appears to have improved upon many of the areas where it has already outperformed the European average, in particular regarding *"Exchange of radiology reports with external providers"*, *"Exchange of laboratory results with external providers"*, *"Exchange of clinical care information with external providers"* and *"PACS usage"*. However, this is not a universal trend, with three values recorded in 2010 actually outperforming 2012 values. *"EAS for disaster recovery in less than 24 hours"*, *"Broadband > 50Mbps"* and *"Single and unified wireless"* have actually fallen since 2010, particularly so in the case of *"EAS for disaster recovery in less than 24 hours"*, which recorded a 35% decrease.

Figure 87: Austrian acute hospitals eHealth profile by ownership
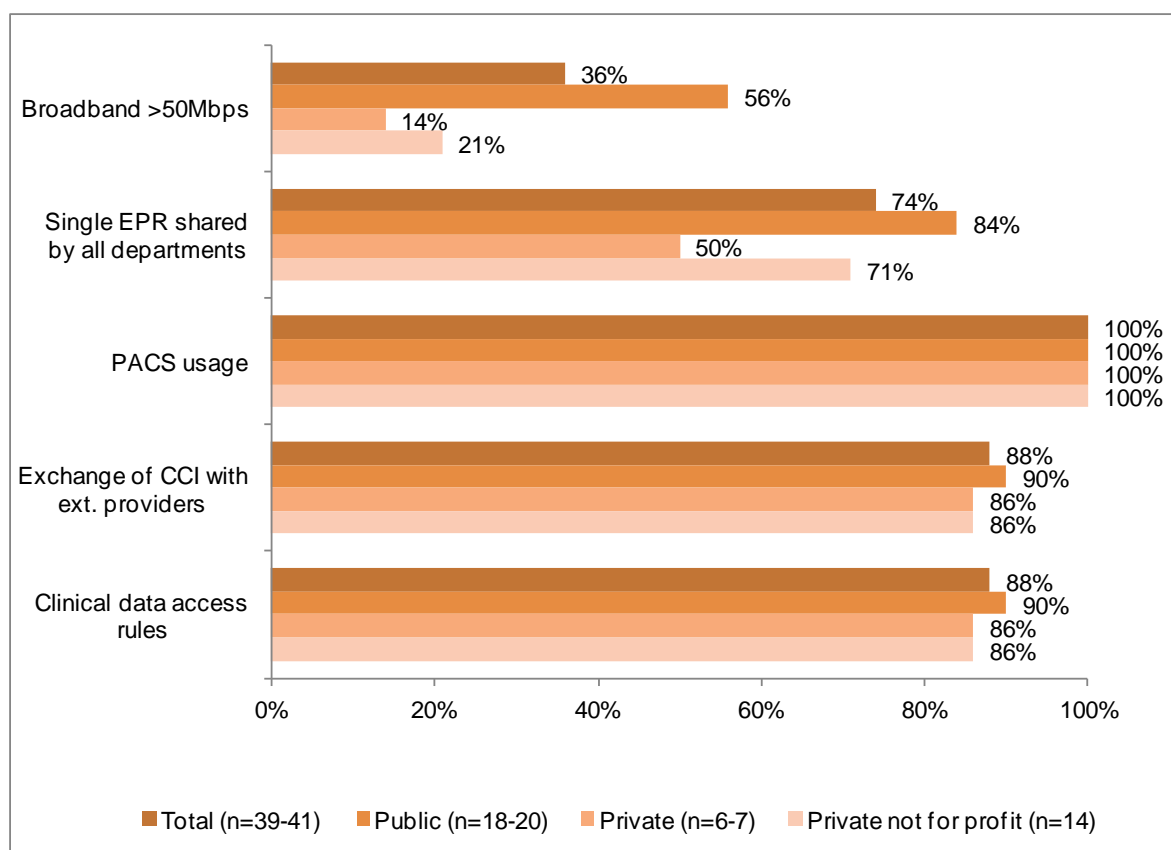
Note: Results are based on valid answers only - category bases may vary from the total reported here.

234   Taking ownership type into account we observe that for *"PACS usage"*, *"Exchange of clinical care information with external providers"* and *"Clear and structured rules on access to clinical data"* all score highly across acute hospitals regardless of ownership type. In these areas, there is no more than a 4% difference between the highest and lowest scoring categories. Additionally, *"PACS usage"* appears to be universal across Austrian acute hospitals, with 100% values for all ownership categories.

235   The results differ markedly for *"Broadband > 50Mbps"* and *"Single EPR shared by all departments"*. In these areas, broad variations could be seen depending on the ownership category. 56% of Public hospitals enjoyed broadband access above the 50Mbps threshold, while only 14% of Private hospitals gave a similar statement. Similarly, 84% of Public acute hospitals had a *"Single EPR shared by all departments"*, contrasting with 50% for Private hospitals and 71% for Private not for profit institutions.

Figure 88: Austrian acute hospitals eHealth profile by size
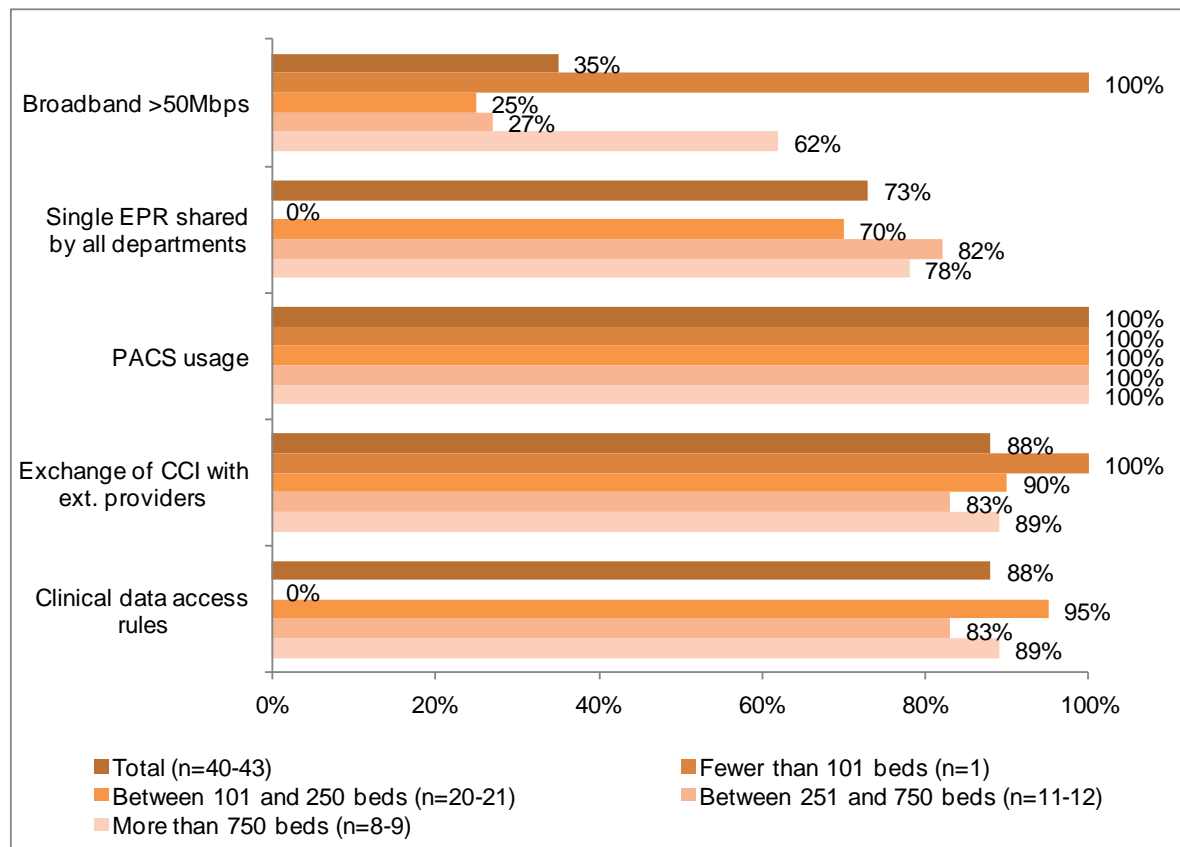
Note: Results are based on valid answers only - category bases may vary from the total reported here.

236   Taking the size of the hospitals into account, again we see that in the majority of areas, Austrian acute hospitals tend not to present significant differences across most of the examined categories. "*PACS usage*" and "*Exchange of clinical care information with external providers*" all score highly, with minimum values all in excess of 80%, with a maximum percentage difference of 17% between small hospitals (fewer than 101 beds) at 100% and larger hospitals (between 251 and 750 beds) at 83%. Except for the smallest hospitals, this can also be seen with "*Clear and structured rules on access to clinical data*".

237   More significant differences can be seen in the areas of "*Broadband > 50Mbps*" and "*Single EPR shared by all departments*". In the former category, small and medium-sized hospitals (two categories which have between 101 and 750 beds) have a markedly lower broadband penetration at 25% and 27% respectively, while the very large hospitals (over 750 beds) have a 62% penetration. The only interviewed hospital with fewer than 101 beds declared having a broadband connection > 50Mbps and no Single EPR.

5.2.2   Belgium's acute hospital eHealth profile

238   436 hospitals were identified in Belgium. Within this sample, 243 (56%) completed the screener part of the questionnaire and of these, 28% qualified as acute care hospitals. Of the 120 screened in, 50 acute hospitals (42%) completed the survey.

239   The two biggest hospital size categories have doubled their number of hospital between 2010 and 2012.

Table 9: Belgian breakdown by size of hospital

Belgium	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	120	3	25	49	25	18
		3%	21%	41%	21%	15%
2012	50	1	10	23	10	6
		2%	20%	46%	20%	12%
2010	23	-	7	11	5	-
		-	30%	48%	22%	-

240   Public hospitals have almost tripled in number between 2010 and 2012; there were 13 private hospitals in 2012 compared to none in 2010.

Table 10: Belgian breakdown by ownership type

Belgium	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	120	47	25	36	12
		39%	21%	30%	10%
2012	50	23	13	13	1
		46%	26%	26%	2%
2010	23	8	-	14	1
		35%	-	61%	4%

Figure 89: Belgian acute hospital eHealth profile
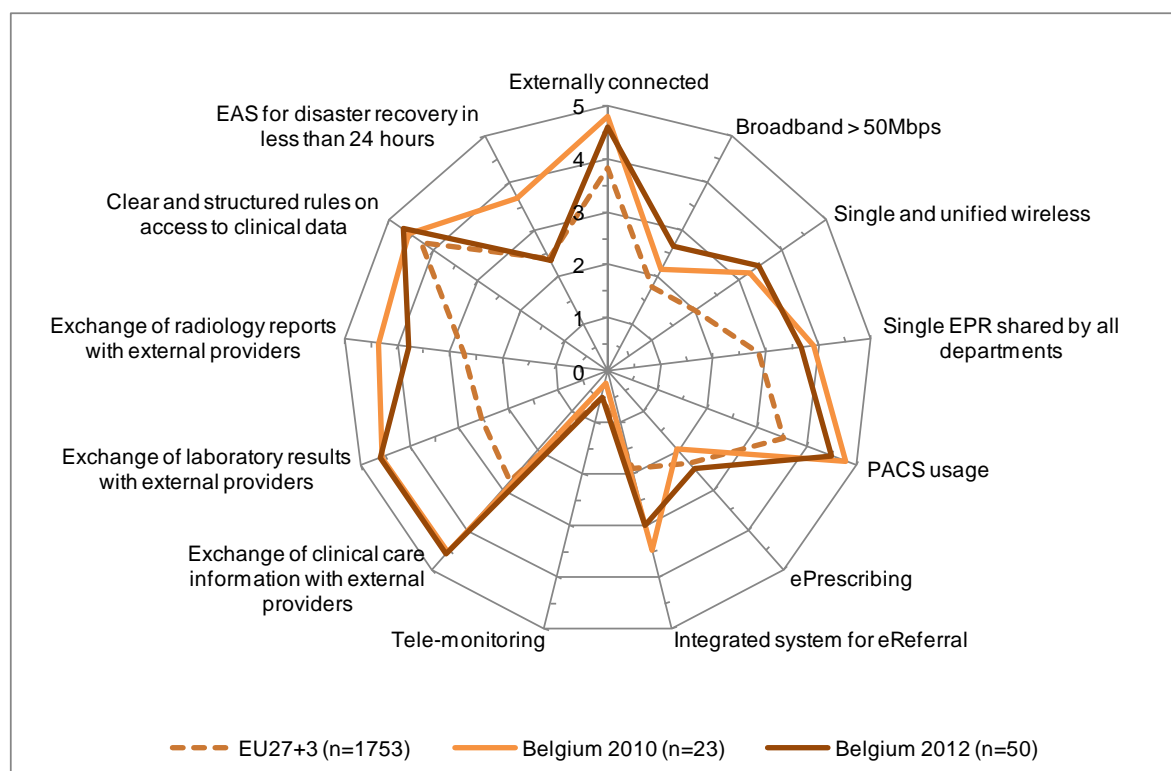
eHealth indicators - Belgium	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	16%	-4%
Broadband > 50Mbps	18%	10%
Single and unified wireless	29%	4%
Single EPR shared by all departments	16%	-5%
PACS usage	19%	-6%
ePrescribing	2%	10%
Integrated system for eReferral	22%	-10%
Tele-monitoring	0%	6%
Exchange of clinical care information with external providers	37%	1%
Exchange of laboratory results with external providers	41%	1%
Exchange of radiology reports with external providers	21%	-11%
Clear and structured rules on access to clinical data	9%	3%
EAS for disaster recovery in less than 24 hours	-1%	-27%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Belgian eHealth profile in EU27+3

241 Belgium outperforms the European average most notably in the following areas: "Externally connected", "Broadband > 50Mbps", "Single and unified wireless", "Single EPR shared by all departments", "PACS usage", "Exchange of clinical care information with external providers", "Exchange of laboratory results with external providers" and "Exchange of radiology reports with external providers". In particular "Exchange of clinical care information with external providers" and "Exchange of laboratory results with external providers" enjoy a substantial lead over the European average, with these areas having a 37% and 41% lead. However, with respect to "EAS for disaster recovery in less than 24 hours", "Tele-monitoring" and "ePrescribing", Belgium either slightly lags behind the average or is very close to the average.

Changes in the Belgian eHealth profile

242 In the intervening period between this study and the last, it appears that Belgium's eHealth profile has remained largely unchanged. With the exception of "*EAS for disaster recovery in less than 24 hours*", which recorded a 27% decrease relative to the 2010 results, most other values occupy a similar range. In fact, other than the EAS result, all other positions registered a shift lower than or equal to −11%.

Figure 90: Belgian acute hospitals eHealth profile by ownership
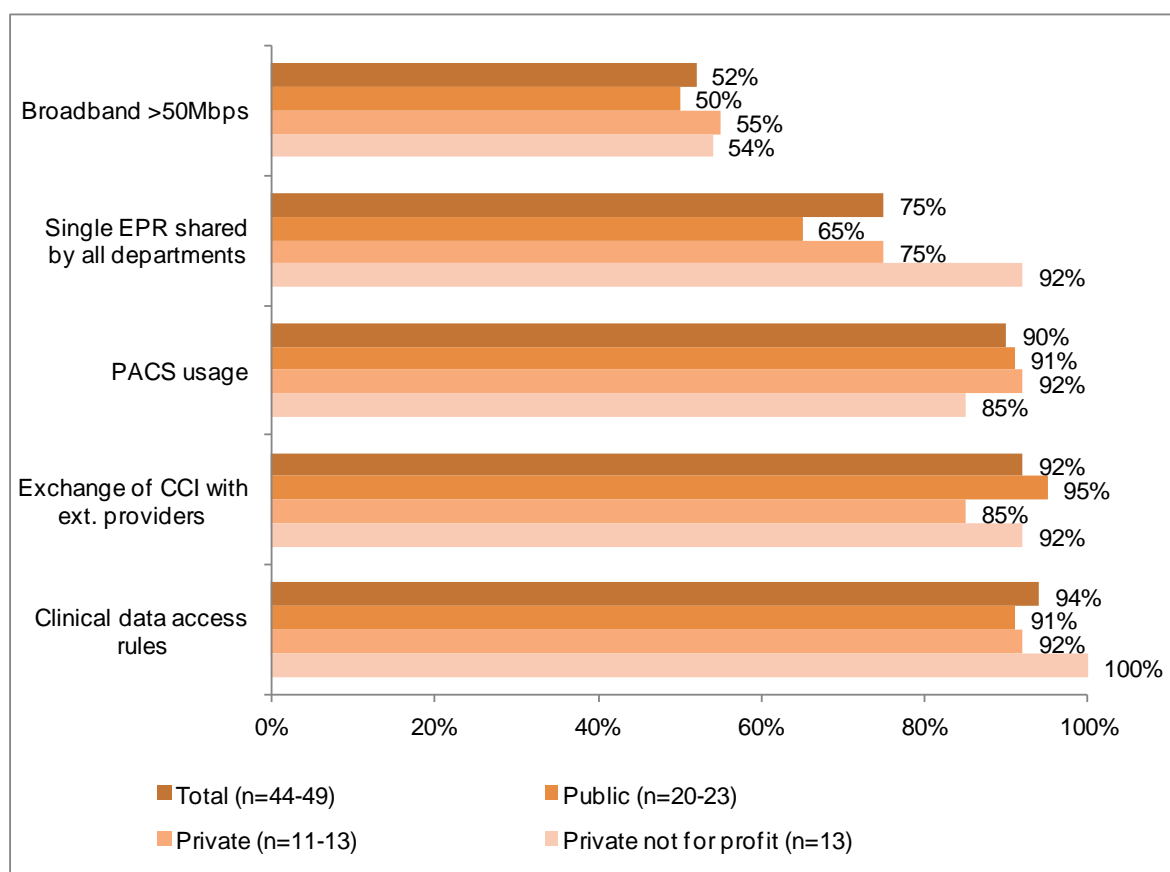
Note: Results are based on valid answers only - category bases may vary from the total reported here.

243 Looking at the ownership types of Belgian hospitals, we can see a generally close range for the majority of the indicators. For "*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*", that the variation in percentage penetration is 10% or less in all three indicators. "*Exchange of clinical care information with external providers*" has the largest variation of these three categories with a 10% variation between Public hospitals (95%) and Private

hospitals (85%). For the other closely matching areas, differences of only 6-7% are in evidence, regardless of ownership type.

244 However, differences are more pronounced for "*Single EPR shared by all departments*". In this category, a difference of 27 percentage points can be seen depending on the ownership type, with Public hospitals, Private hospitals and Private not for profit hospitals recording respectively 65%, 75% and 92% penetration for this category.

245 Almost no difference was observed for "*Broadband > 50Mbps*", with only a 5% difference between public hospitals (50% penetration) and private hospitals (55% penetration). Private not for profit hospitals occupy a midway point with a 54% penetration rate.

Figure 91: Belgian acute hospitals eHealth profile by size
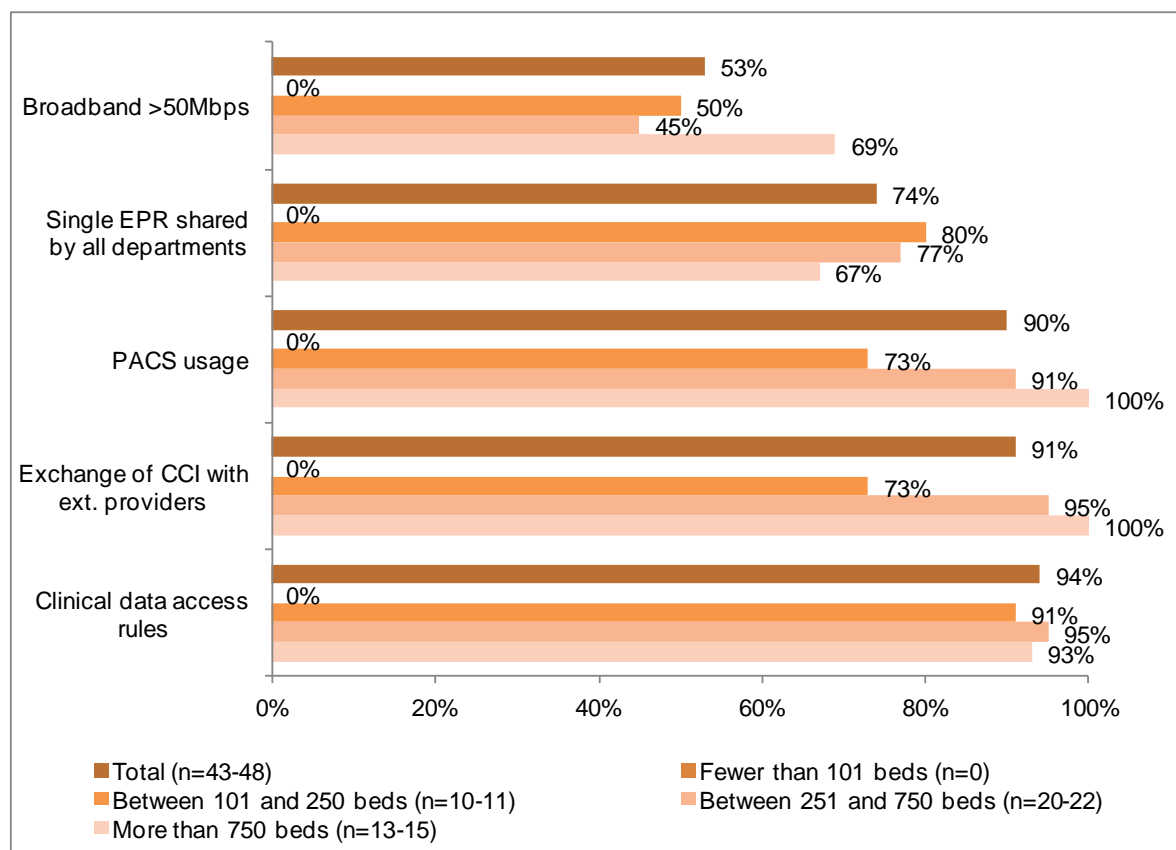
Note: Results are based on valid answers only - category bases may vary from the total reported here.

246 When we take hospital scale into consideration we can see more differentiation across multiple areas. With the exception of "*Clear and structured rules on access to clinical data*", where variation between hospitals is at a maximum of 4% and all reported hospital size groupings display over 90% penetration, all other areas show a large disparity between eHealth profile values. "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*PACS usage*" and "*Exchange of clinical care information with external providers*" all display variations of 12-25%. However, it does not appear that scale is by itself a determinant of penetration in this context. For example, while the largest acute hospitals (over 750 beds) have 100% usage of "*PACS usage*" and "*Exchange of clinical care information with external providers*" and 69% of "*Broadband > 50Mbps*", when we examine "*Single EPR shared by all departments*" the largest hospitals actually lag behind the smaller ones.

5.2.3 Bulgaria's acute hospital eHealth profile

247   388 hospitals were identified in Bulgaria. Within this sample, 207 (53%) completed the screener part of the questionnaire and of these, 25% qualified as acute care hospitals. Of the 109 screened in, 62 acute hospitals (57%) completed the survey.

248   All the hospital categories but the biggest one significantly increased their number of hospitals between 2010 and 2012.

Table 11: Bulgarian breakdown by size of hospital

Bulgaria	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	109	35	32	30	6	6
		32%	29%	28%	6%	6%
2012	62	22	17	18	3	2
		35%	27%	29%	5%	3%
2010	15	5	3	4	3	-
		33%	20%	27%	20%	-

249   All the ownership categories but private not for profit significantly increased their number of hospitals.

Table 12: Bulgarian breakdown by ownership type

Bulgaria	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	109	73	24	1	11
		67%	22%	1%	10%
2012	62	43	14	-	5
		69%	23%	-	8%
2010	15	11	3	1	-
		73%	20%	7%	-

Figure 92: Bulgarian acute hospital eHealth profile
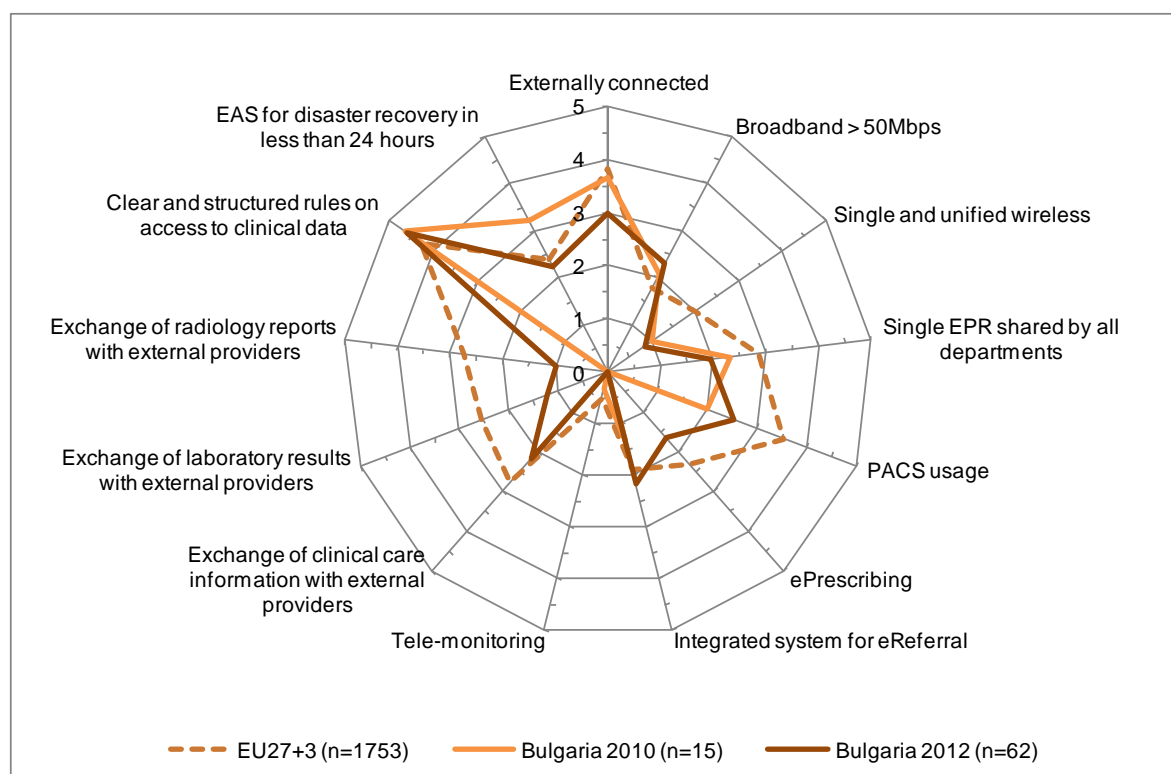
eHealth indicators - Bulgaria	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-17%	-14%
Broadband > 50Mbps	11%	4%
Single and unified wireless	-23%	-3%
Single EPR shared by all departments	-18%	-7%
PACS usage	-20%	11%
ePrescribing	-13%	33%
Integrated system for eReferral	6%	17%
Tele-monitoring	-10%	-7%
Exchange of clinical care information with external providers	-11%	44%
Exchange of laboratory results with external providers	-27%	25%
Exchange of radiology reports with external providers	-35%	20%
Clear and structured rules on access to clinical data	7%	-1%
EAS for disaster recovery in less than 24 hours	-3%	-19%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

131

Position of the Bulgarian eHealth profile within EU27+3

250   Bulgaria significantly underperforms the European average in many areas, although the underperformance is most evident in a select number of areas. "*Exchange of radiology reports with external providers*", "*Exchange of laboratory results with external providers*" and "*PACS usage*" are the largest underperforming areas, with discrepancies of –35%, –27% and –20% respectively. However, other areas fared better, with "*Clear and structured rules on access to clinical data*", "*Broadband > 50Mbps*" and "*Integrated system for eReferral*" all very close to the European average.

Change in the Bulgarian eHealth profile

251   While Bulgaria underperforms the European average, it has shown some significant advances within a two-year period. These advances are most noteworthy in the areas of "*Exchange of radiology reports with external providers*" (+20%), "*Exchange of clinical care information with external providers*" (+44%) and also "*ePrescribing*" (+33%). Two areas appear to have suffered notable contraction: "*EAS for disaster recovery in less than 24 hours*" and "*Externally connected*" which are now –19% and –14% below the 2010 value respectively.

Figure 93: Bulgarian acute hospitals eHealth profile by ownership type
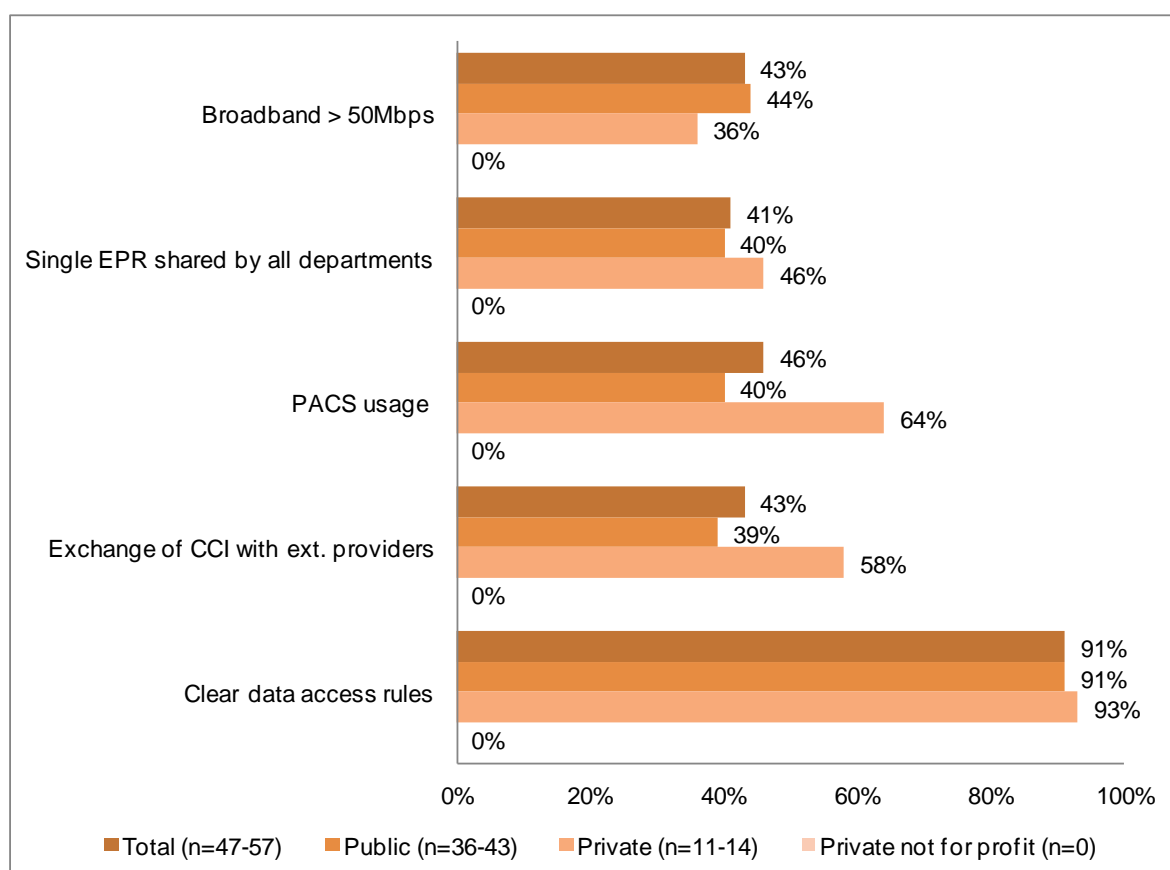
Note: Results are based on valid answers only - category bases may vary from the total reported here.

252   With the exception of "*Clear and structured rules on access to clinical data*" and "*Single EPR shared by all departments*", where penetration values are relatively close across both Public and Private hospitals (within maximum 6% difference), other areas ("*Broadband > 50Mbps*", "*Exchange of clinical care information with external providers*" and "*PACS usage*") show important differences. "*Broadband > 50Mbps*" displays an 8 percentage point gap between Public and Private hospitals, "*Exchange of clinical care information with external providers*" a 19 percentage point gap and "*PACS usage*" even a 24 percentage point gap. Looking across ownership types, Private hospitals appear to be generally better endowed with respect to eHealth facilities, with the exception of "*Broadband > 50Mbps*", where Private hospitals lag behind Public hospitals.

Figure 94: Bulgarian acute hospitals eHealth profile by size
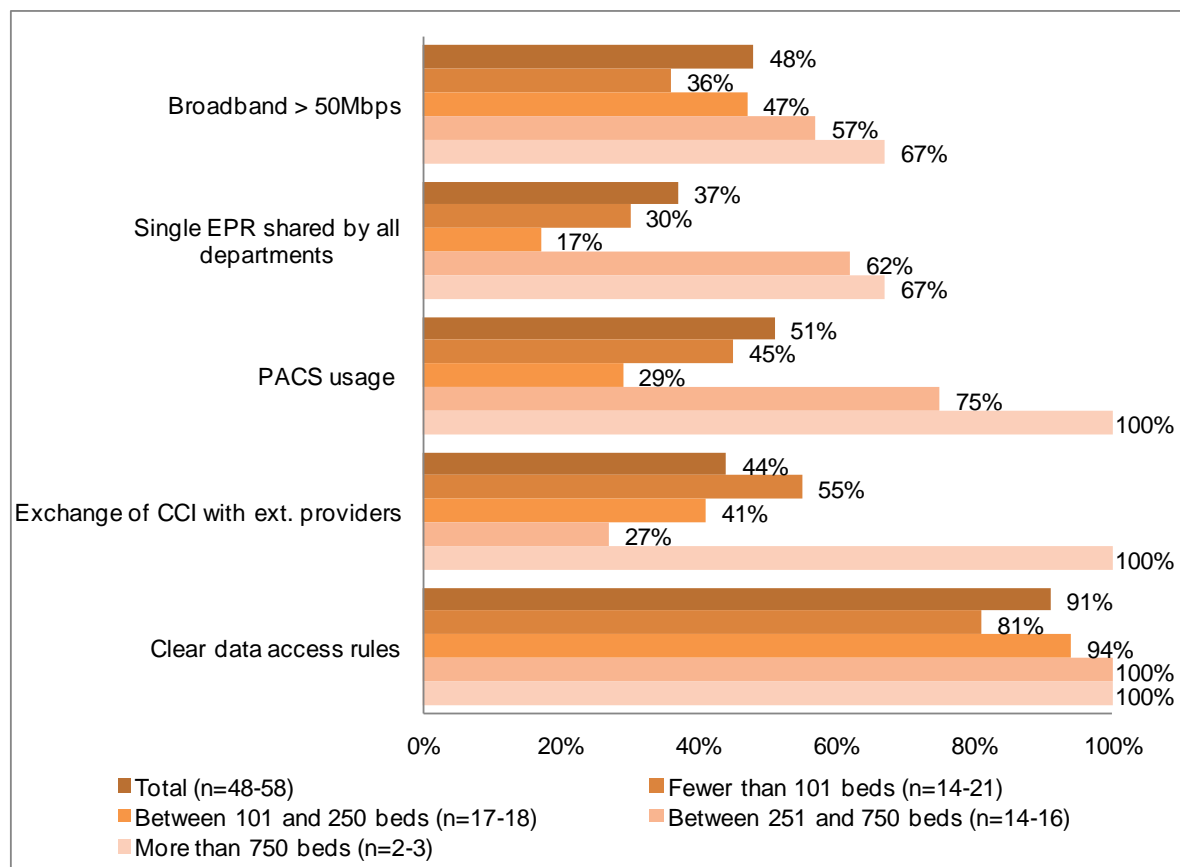
Note: Results are based on valid answers only - category bases may vary from the total reported here.

253 The clearest differences in eHealth profile become apparent when Bulgarian hospitals are differentiated by size. In every single category, hospitals with more than 750 beds outperform or equal hospitals of a smaller size segment. However, when looking at the other hospital size categories, the relationship between scales is less pronounced. For example, hospitals of between 251 and 750 beds also outperform smaller hospitals in most categories, but seriously underperform in "*Exchange of clinical care information with external providers*", being the last in this category (27% score). Below this level, the relationship between scale and take-up is not clear, as hospitals with between 101 and 250 beds outperform hospitals with fewer than 101 beds in only two categories.

5.2.4   Croatia's acute hospital eHealth profile

254   75 hospitals were identified in Croatia. Within this sample, 32 (43%) completed the screener part of the questionnaire and of these, 29% qualified as acute care hospitals. Of the 22 screened in, 11 acute hospitals (50%) completed the survey.

255   The number of intermediate size hospitals increased from 2 in 2010 to 6 in 2012 and two hospitals with more than 750 beds have been created over the same period.

Table 13: Croatian breakdown by size of hospital

Croatia	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	22	-	4	9	6	3
		-	18%	41%	27%	14%
2012	11	-	2	6	2	1
		-	18%	55%	18%	9%
2010	4	-	2	2	-	-
		-	50%	50%	-	-

The number of Public hospitals (the only category present) has more than doubled between 2010 and 2012.

Table 14: Croatian breakdown by ownership type

Croatia	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	22	20	-	-	2
		91%	-	-	9%
2012	11	11	-	-	-
		100%	-	-	-
2010	4	4	-	-	-
		100%	-	-	-

Figure 95: Croatian acute hospital eHealth profile
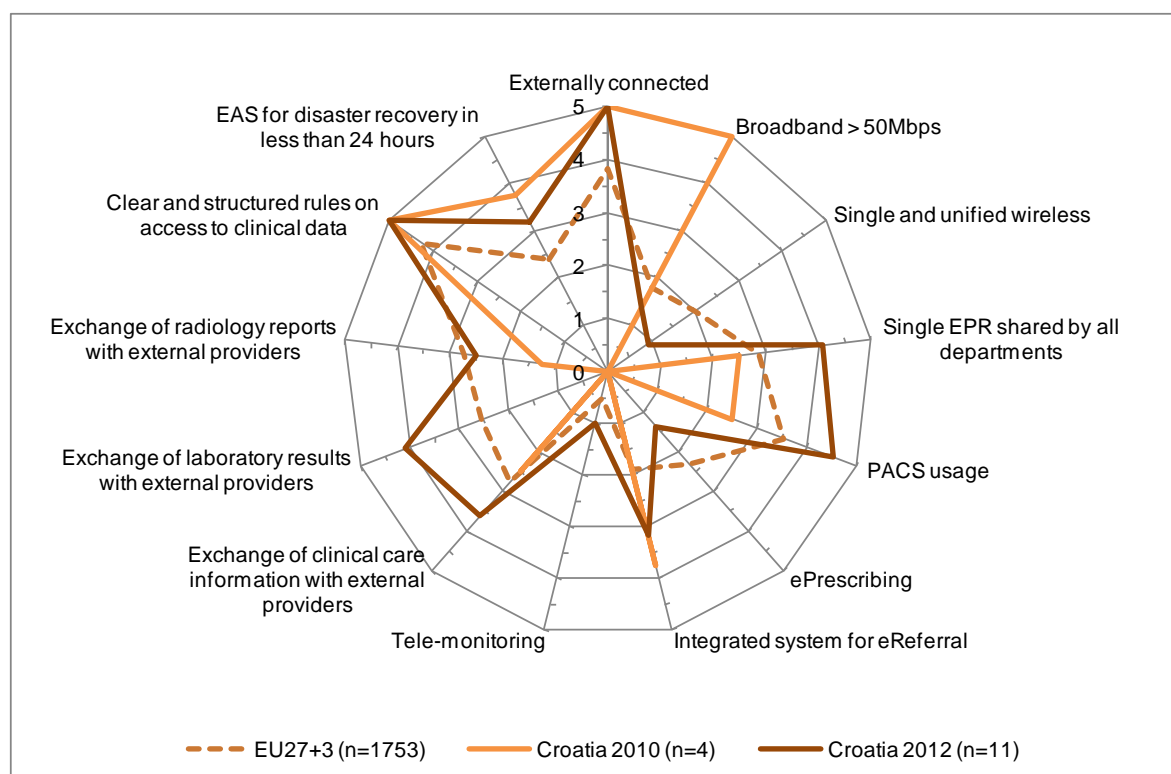
eHealth indicators - Croatia	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	24%	0%
Broadband > 50Mbps	-8%	-73%
Single and unified wireless	-22%	18%
Single EPR shared by all departments	25%	32%
PACS usage	20%	41%
ePrescribing	-19%	27%
Integrated system for eReferral	26%	-11%
Tele-monitoring	10%	20%
Exchange of clinical care information with external providers	17%	23%
Exchange of laboratory results with external providers	31%	82%
Exchange of radiology reports with external providers	-5%	25%
Clear and structured rules on access to clinical data	15%	0%
EAS for disaster recovery in less than 24 hours	16%	-11%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Croatian eHealth profile within EU27+3

256   Croatia remains close to the European average regarding the development of its eHealth profile, with some underperformance and some overperformance across the range of examined indicators. Areas of overperformance include: "*Externally connected*", "*Single EPR shared by all departments*", "*PACS usage*", "*Integrated system for eReferral*", "*Tele-monitoring*", "*Exchange of clinical care information with external providers*", "*Exchange of laboratory results with external providers*", "*Clear and structured rules on access to clinical data*" and "*EAS for disaster recovery in less than 24 hours*". Compared the EU27+3 average, underperforming areas included "*Broadband > 50Mbps*", "*Single and unified wireless*", "*ePrescribing*", and "*Exchange of radiology reports with external providers*" (although in the latter case, the underperformance is marginal).

Change in the Croatian eHealth profile

257   Interestingly, the development of Croatia's eHealth profile has been strong between 2010 and 2012. Croatia demonstrated a healthy growth in eHealth endowment across the acute hospital sector. Five areas in particular recorded high growth: "*Single EPR shared by all departments*", "*PACS usage*", "*ePrescribing*", "*Exchange of clinical care information with external providers*" and "*Exchange of laboratory results with external providers*".

258   With respect to ownership, only data for Public hospitals are available, and therefore no comparisons can be drawn in this context.

Figure 96: Croatian acute hospitals eHealth profile by size
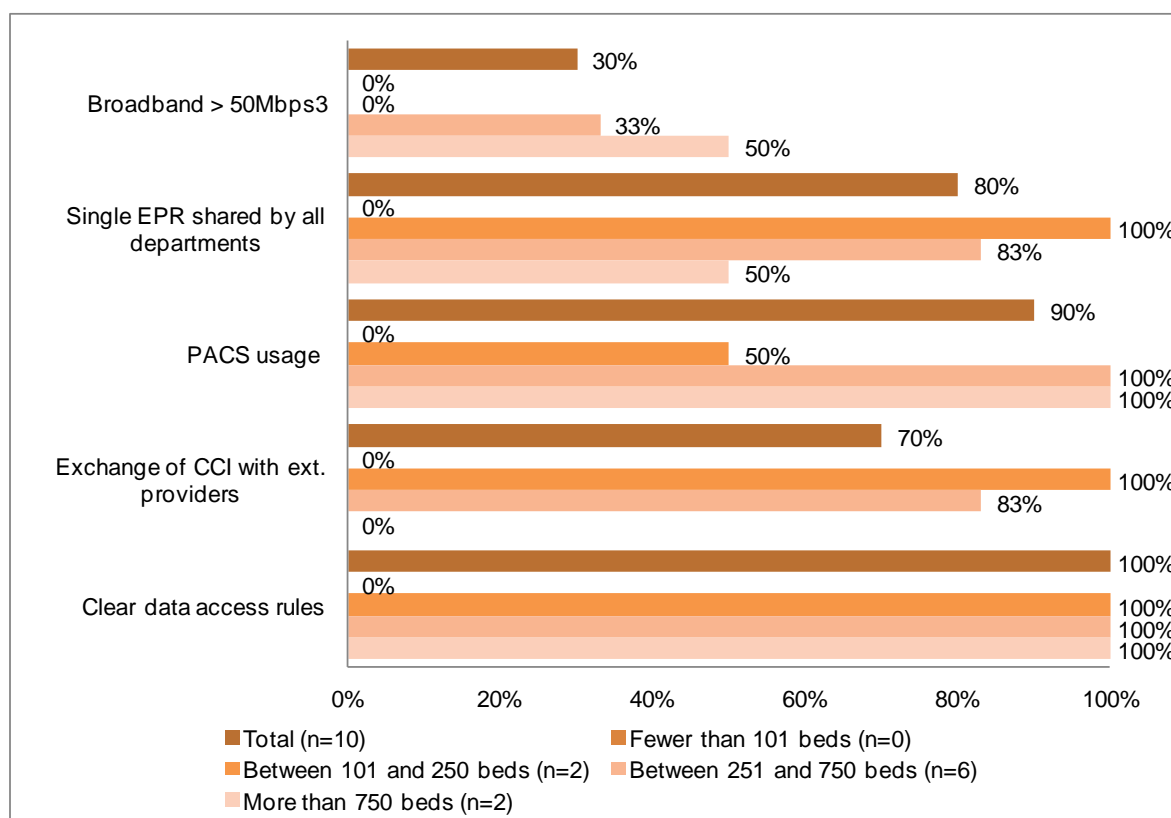
Note: Results are based on valid answers only - category bases may vary from the total reported here.

259   When taking the size of hospitals into account, we can see very good penetration of "*Clear and structured rules on access to clinical data*" across all size segments. Otherwise the results do not show any strong patterns. For example, larger hospitals (including hospitals with between 251 and 750 beds and those with over 750 beds) perform well regarding "*PACS usage*". However, with respect to "*Exchange of clinical care information with external providers*", smaller hospitals (between 101 and 250 beds) have 100%

representation. This is again the case regarding "*Single EPR shared by all departments*", where smaller hospitals (between 101 and 250 beds) outperform the larger segments (between 250 and 750 beds) by between 17 and 50 percentage points. Overall values for "*Broadband > 50Mbps*" range between 33% and 50% penetration for the two largest size segments respectively.

5.2.5   Cyprus's acute hospital eHealth profile

260   70 hospitals were identified in Cyprus. Within this sample, 54 (77%) completed the screener part of the questionnaire and, of these, 31% qualified as acute care hospitals. Of the 22 screened in, 13 acute hospitals (59%) completed the survey.

261   The breakdown of hospitals by size has remained approximately the same between 2010 and 2012.

Table 15: Cypriot breakdown by size of hospital

Cyprus	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	22	17	2	-	-	3
		77%	9%	-	-	14%
2012	13	9	2	-	-	2
		69%	15%	-	-	15%
2010	8	5	-	1	-	2
		62%	-	12%	-	25%

262   The breakdown by ownership type has remained approximately the same between 2010 and 2012.

Table 16: Cypriot breakdown by ownership type

Cyprus	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	22	2	19	-	1
		9%	86%	-	5%
2012	13	1	12	-	-
		8%	92%	-	-
2010	8	4	4	-	-
		50%	50%	-	-

Figure 97: Cypriot acute hospital eHealth profile
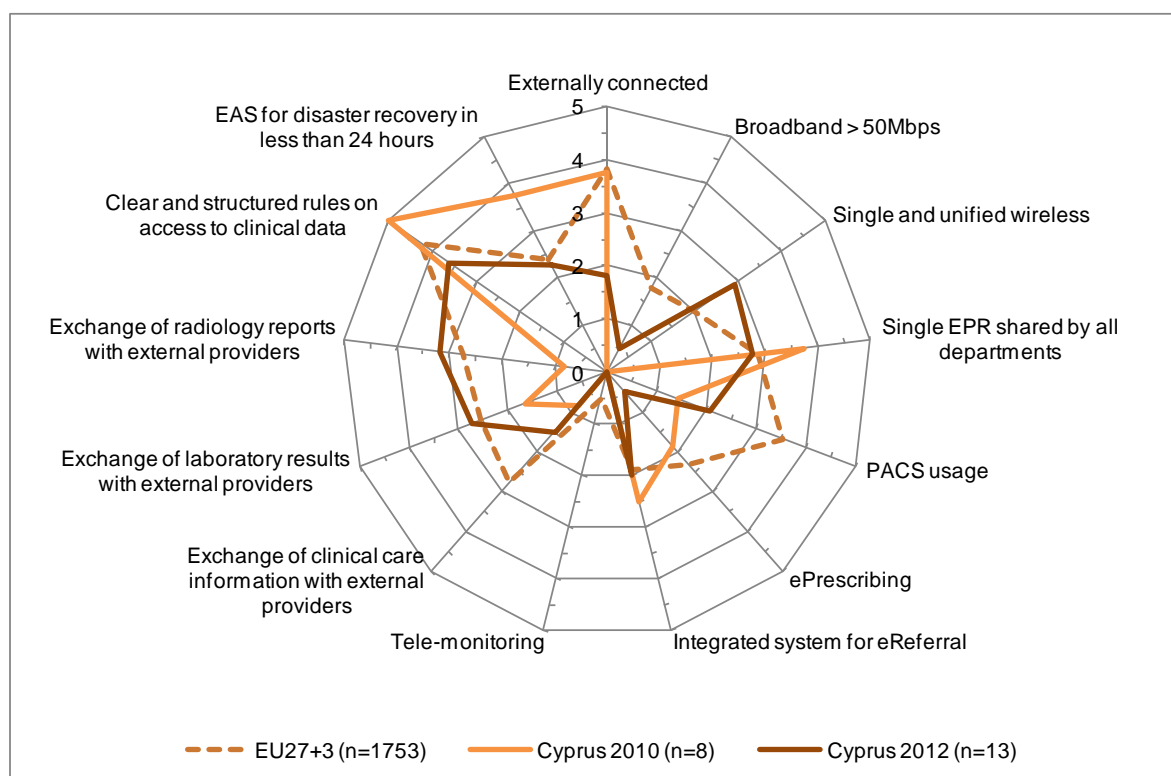
eHealth indicators - Cyprus	score difference 2012-Eu27+3	score difference 2012-2010
Externally connected	-40%	-39%
Broadband > 50Mbps	-26%	10%
Single and unified wireless	18%	58%
Single EPR shared by all departments	-1%	-19%
PACS usage	-29%	13%
ePrescribing	-37%	-28%
Integrated system for eReferral	2%	-10%
Tele-monitoring	-10%	0%
Exchange of clinical care information with external providers	-25%	13%
Exchange of laboratory results with external providers	3%	21%
Exchange of radiology reports with external providers	9%	47%
Clear and structured rules on access to clinical data	-13%	-27%
EAS for disaster recovery in less than 24 hours	-3%	-30%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Cypriot eHealth profile within EU27+3

263   Cyprus remains below the European average in many areas. Of the 13 indicators under review, Cyprus was behind in 9 of these. The largest gaps were recorded in "*Externally connected*" (-40%), "*Broadband >50Mbps*" (-26%), "*PACS usage*" (-29%), and "*ePrescribing*" (-37%). Many other areas are below 1 point in terms of difference, with some negative values relatively close to zero.

Changes in the Cypriot eHealth profile

264   Cyprus's aggregate eHealth score has changed little between 2010 and 2012. However, the distribution of the individual values comprising the aggregate profile appears to have changed significantly. Of the 1313 indicators considered, six have recorded positive growth, six have recorded negative growth, while one value remained unchanged. The most important growth areas were "*Single and unified wireless*" and "*Exchange of radiology reports with external providers*" (58% and 47% respectively), while contracting areas included "*Externally connected*" (-39%) and "*EAS for disaster recovery in less than 24 hours*" (-30%).

Figure 98: Cypriot acute hospitals eHealth profile by ownership
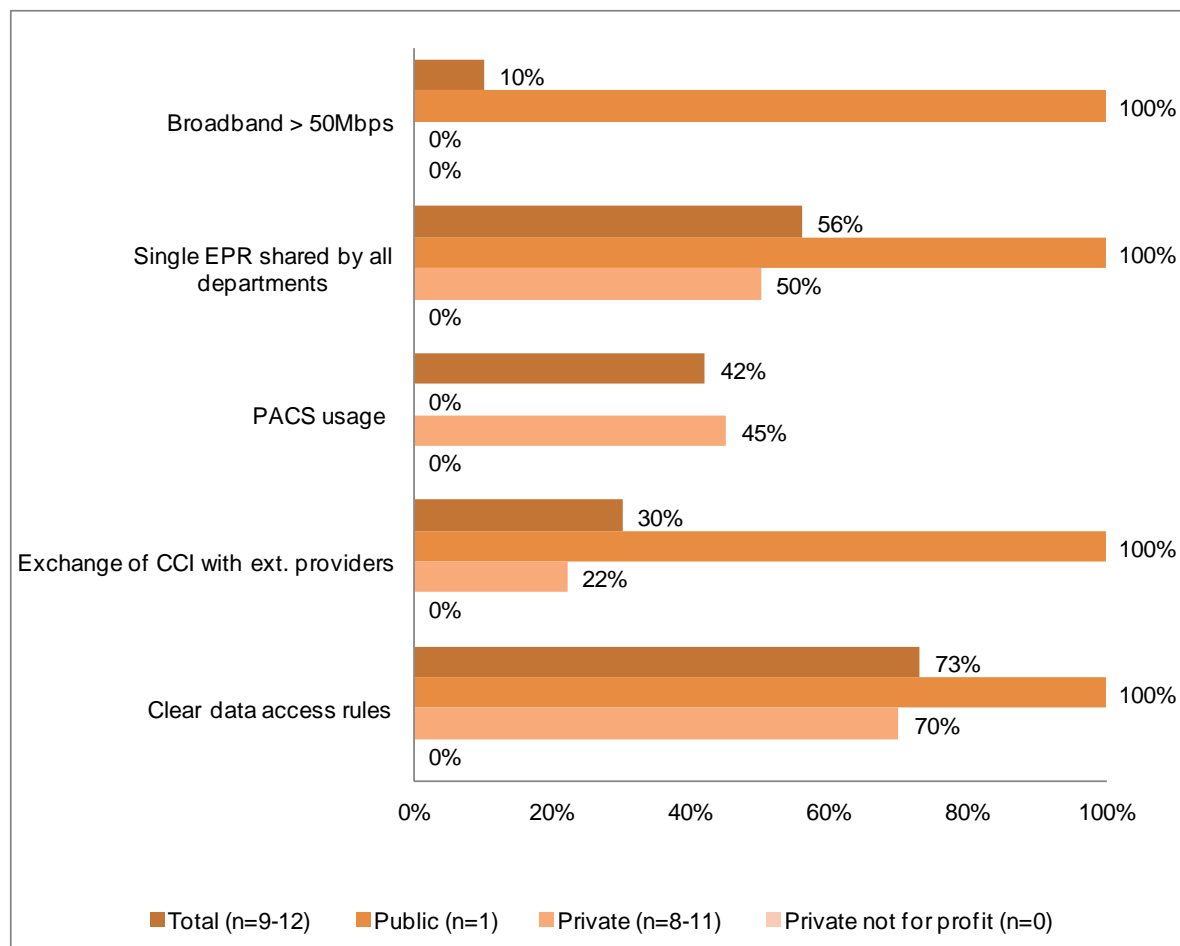
Note: Results are based on valid answers only - category bases may vary from the total reported here.

265   Values for one Public and eight to eleven Private acute hospitals have been recorded for Cyprus. 100% of Public hospitals and 70% of Private hospitals declared having "*Clear and structured rules on access to clinical data*", whereas 50% of the private hospitals have a "*Single EPR shared by all departments*" and 22% "*Exchange of clinical care information with external providers*". While the sole Public hospital declared having access to all services except for "*PACS usage*", this last service was available in 45% of Private hospitals.

Figure 99: Cypriot acute hospitals eHealth profile by size
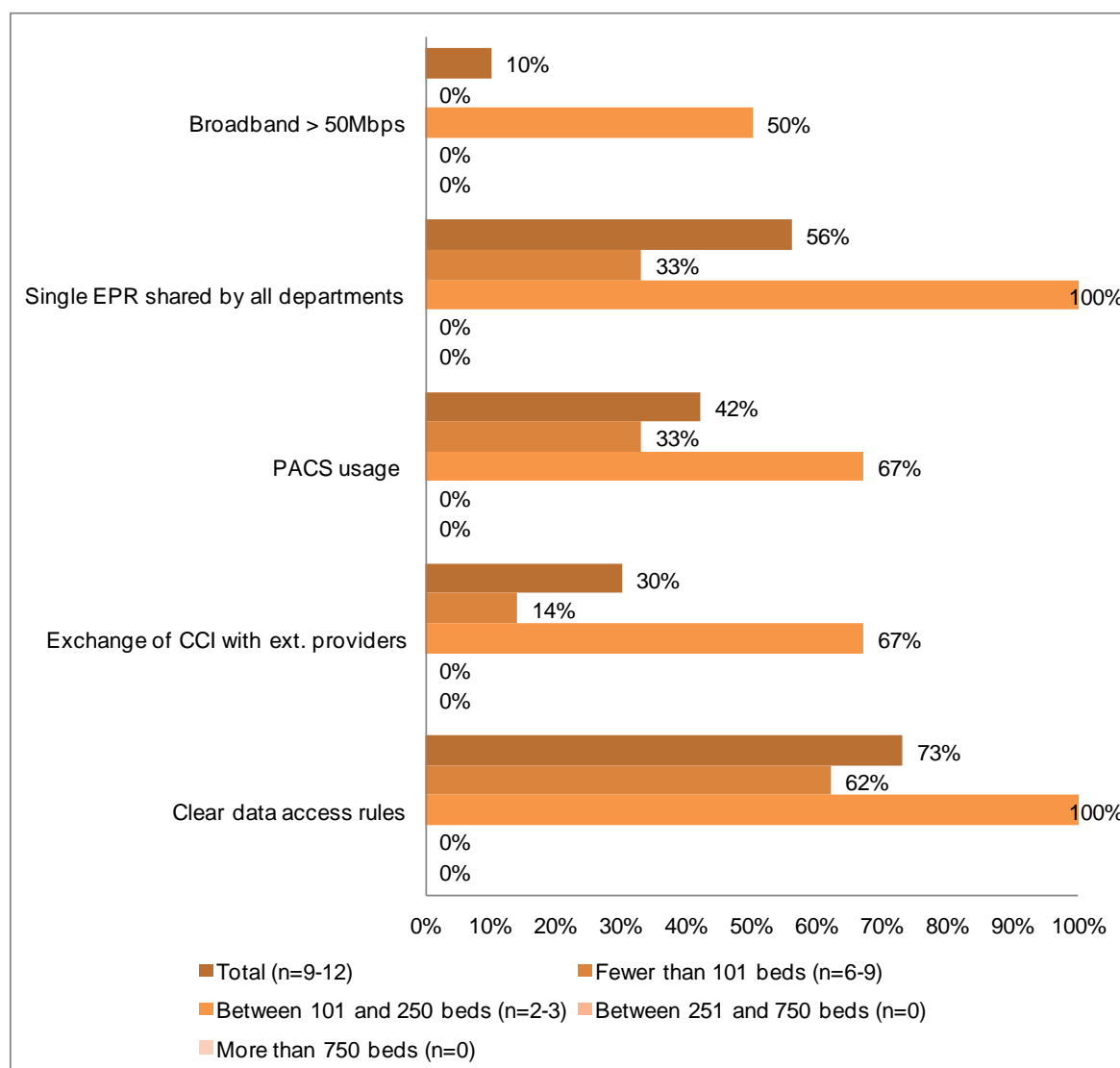
Note: Results are based on valid answers only - category bases may vary from the total reported here.

266 As Cyprus is one of the smallest European states, it is not surprising that no values were returned for the size segments of 'Between 251 and 750 beds' and 'More than 750 beds'. Therefore our analysis is confined to the smaller categories, namely 'fewer than 101 beds' and 'between 101 and 250 beds'. Within this grouping, the larger hospitals tend to lead in all five categories. In addition, the disparity between Cyprus's larger and smaller hospitals is striking, with "*Single EPR shared by all departments*", "*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*" registering differences of 67, 34, 53 and 38 percentage points respectively. Interestingly, only one hospital declared having access to "*Broadband > 50Mbps*".

5.2.6 The Czech Republic's acute hospital eHealth profile

267 470 hospitals were identified in the Czech Republic. Within this sample, 269 (57%) completed the screener part of the questionnaire and, of these, 30% qualified as acute care hospitals. Of the 142 screened in, 40 acute hospitals (28%) completed the survey.

268 All the hospital size categories but the largest have at least tripled their number of hospitals between 2010 and 2012.

Table 17: Czech breakdown by size of hospital

Czech Republic	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	142	10	45	44	16	27
		7%	32%	31%	11%	19%
2012	40	3	12	11	6	8
		8%	30%	28%	15%	20%
2010	15	1	4	3	6	1
		7%	27%	20%	40%	7%

269 All the ownership categories have doubled their number of hospitals between 2010 and 2012.

Table 18: Czech breakdown by size of hospital

Czech Republic	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	142	89	37	5	11
		63%	26%	4%	8%
2012	40	25	11	2	2
		62%	28%	5%	5%
2010	15	10	3	1	1
		67%	20%	7%	7%

Figure 100: Czech acute hospital eHealth profile
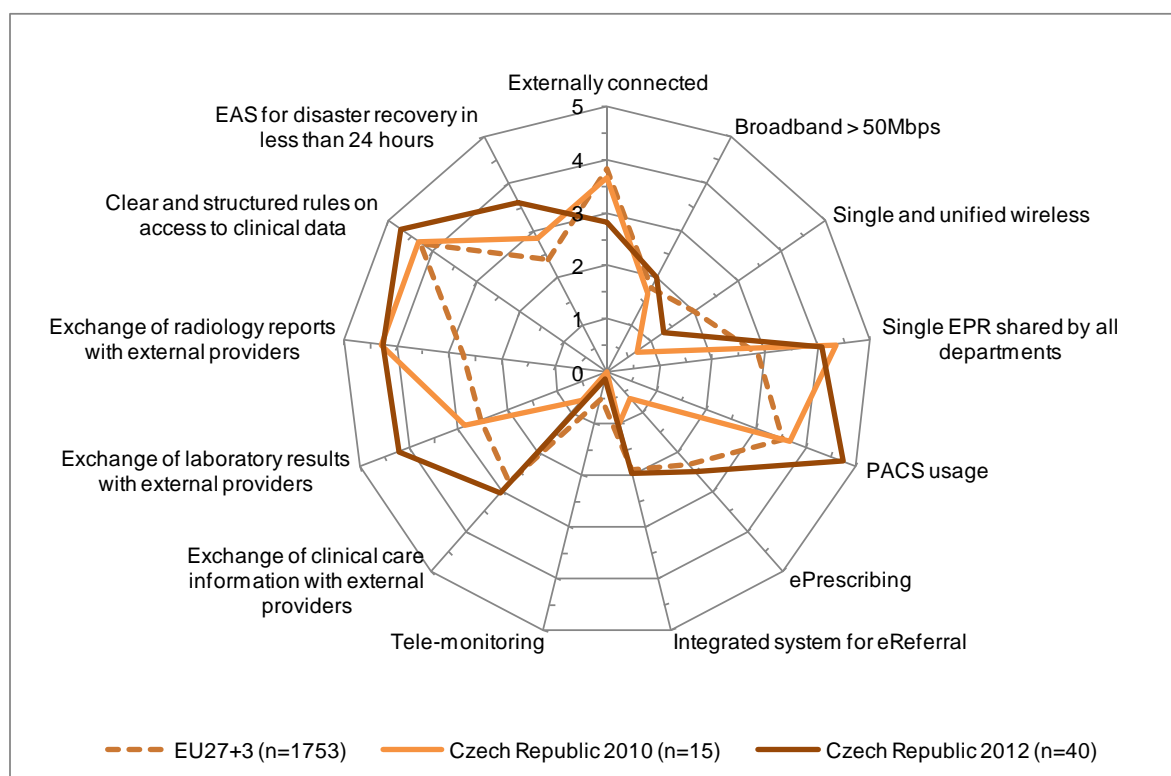
eHealth indicators - Czech Republic	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-20%	-17%
Broadband > 50Mbps	5%	7%
Single and unified wireless	-14%	12%
Single EPR shared by all departments	25%	-5%
PACS usage	24%	22%
ePrescribing	3%	37%
Integrated system for eReferral	1%	19%
Tele-monitoring	-8%	3%
Exchange of clinical care information with external providers	6%	47%
Exchange of laboratory results with external providers	33%	27%
Exchange of radiology reports with external providers	30%	-1%
Clear and structured rules on access to clinical data	10%	8%
EAS for disaster recovery in less than 24 hours	24%	15%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Czech eHealth profile within the EU27+3

270   The Czech Republic exceeded the European average score in eHealth profile indicators, in particular in the areas of "*Single EPR shared by all departments*" (25%), "*PACS usage*" (24%), "*Exchange of laboratory results with external providers*" (33%), "*Exchange of radiology reports with external providers*" (30%) and "*EAS for disaster recovery in less than 24 hours*" (24%). Areas in which the country notably underperforms the average were "*Externally connected*" (-20%), "*Single and unified wireless*" (-14%) and "*Tele-monitoring*" (-8%).

Change in the Czech eHealth profile

271   The Czech eHealth profile has expanded considerably since 2010. Areas which have seen the most gain include "*ePrescribing*" (+37%), "*Exchange of clinical care information with external providers*" (+47%) and "*Exchange of laboratory results with external providers*" (+27%). In contrast, the Czech Republic reported only three areas with negative growth; however in each of these areas the drop did not exceed 17%.

Figure 101: Czech acute hospitals eHealth profile by ownership
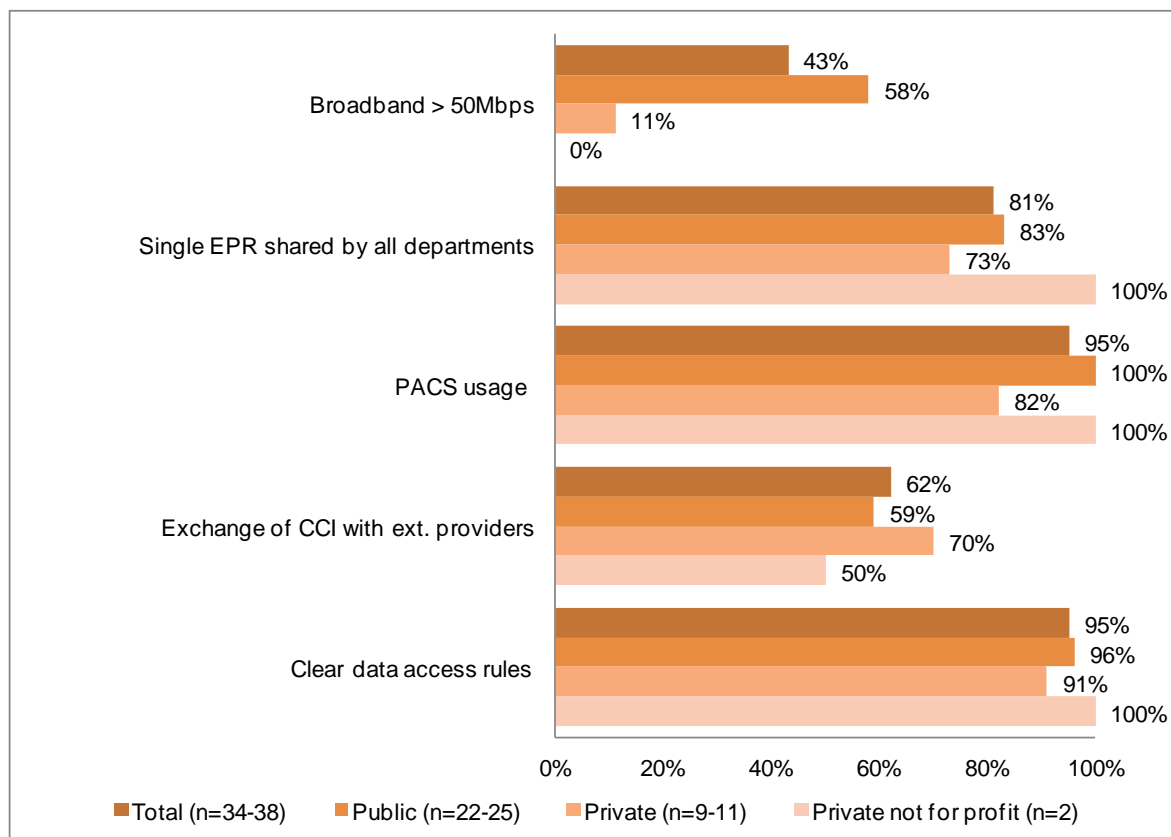
Note: Results are based on valid answers only - category bases may vary from the total reported here.

272   Some patterns can be seen with respect to ownership of acute hospitals and performance within eHealth. Although the two Private not for profit hospitals scored 100% in three of the five categories ("*Single EPR shared by all departments*", "*PACS usage*" and "*Clear and structured rules on access to clinical data*"), they did not have "*Broadband > 50Mbps*" and were the lowest performer (50%) in "*Exchange of clinical care information with external providers*". When comparing the Public and Private hospital segments, a relatively narrow percentage point difference can be seen in four of the five categories, whereas a 47 percentage point difference was observed for "*Broadband > 50Mbps*".

Figure 102: Czech acute hospitals eHealth profile by size
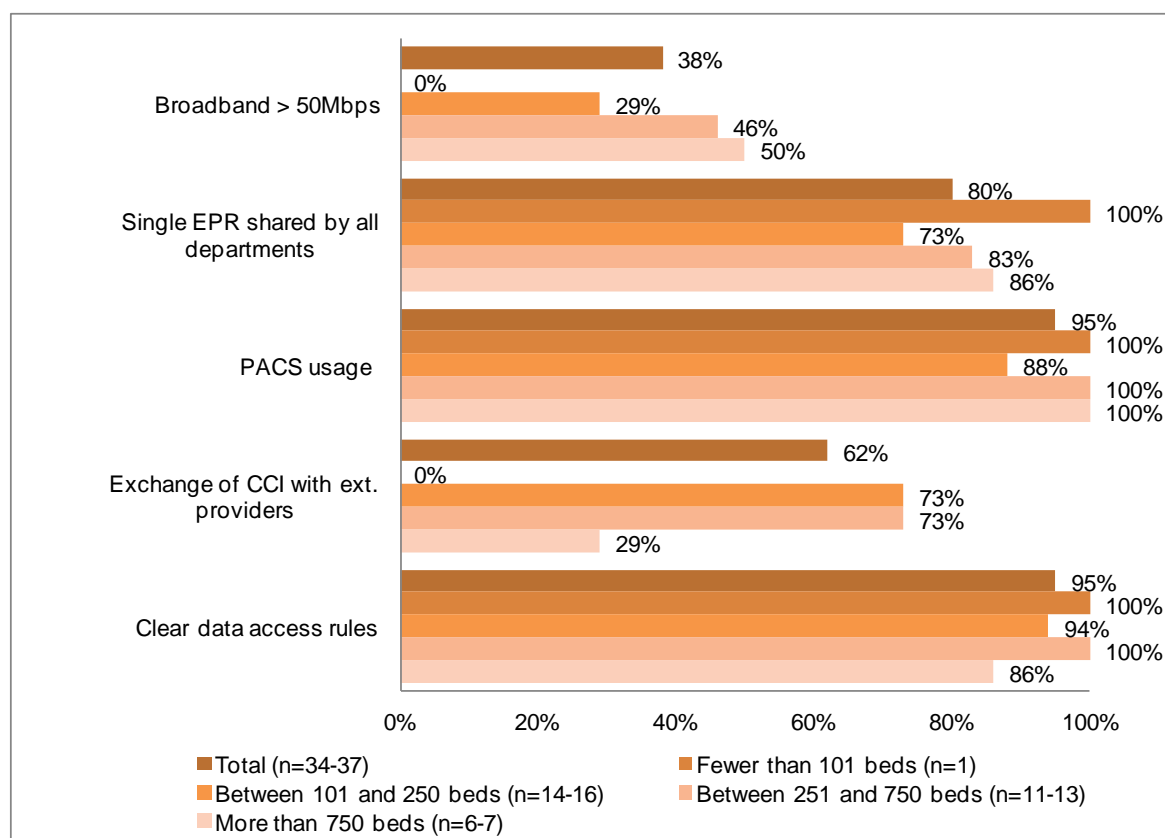
Note: Results are based on valid answers only - category bases may vary from the total reported here.

273   The results based on the scale of the hospital appear somewhat counterintuitive. While it could be expected that scale advantages would allow for greater take-up of eHealth solutions, hospitals with fewer than 101 beds recorded high scores in three of the five categories, namely "*Single EPR shared by all departments*", "*PACS usage*" and "*Clear and structured rules on access to clinical data*". However, this segment comprises only one surveyed hospital, which is absent from two categories ("*Broadband > 50Mbps*" and "*Exchange of clinical care information with external providers*"). Additionally, hospitals with between 251 and 750 beds scored 100% values in two of the five categories ("*PACS usage*" and "*Clear and structured rules on access to clinical data*").

5.2.7   Denmark's acute hospital eHealth profile

274   270 hospitals were identified in Denmark. Within this sample, 126 (47%) completed the screener part of the questionnaire and, of these, 20% qualified as acute care hospitals. Of the 54 screened in, 16 acute hospitals (30%) completed the survey.

275   The breakdown by size between 2010 and 2012 remain approximately the same.

Table 19: Danish breakdown by size of hospital

Denmark	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	54	17	3	14	8	12
		31%	6%	26%	15%	22%
2012	16	5	-	5	3	3
		31%	-	31%	19%	19%
2010	8	-	1	4	3	-
		-	12%	50%	38%	-

276   The breakdown by ownership type has not changed significantly between 2010 and 2012.

Table 20: Danish breakdown by ownership type

Denmark	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	54	38	11	1	4
		70%	20%	2%	7%
2012	16	11	4	1	-
		69%	25%	6%	-
2010	8	8	-	-	-
		100%	-	-	-

Figure 103: Danish acute hospital eHealth profile
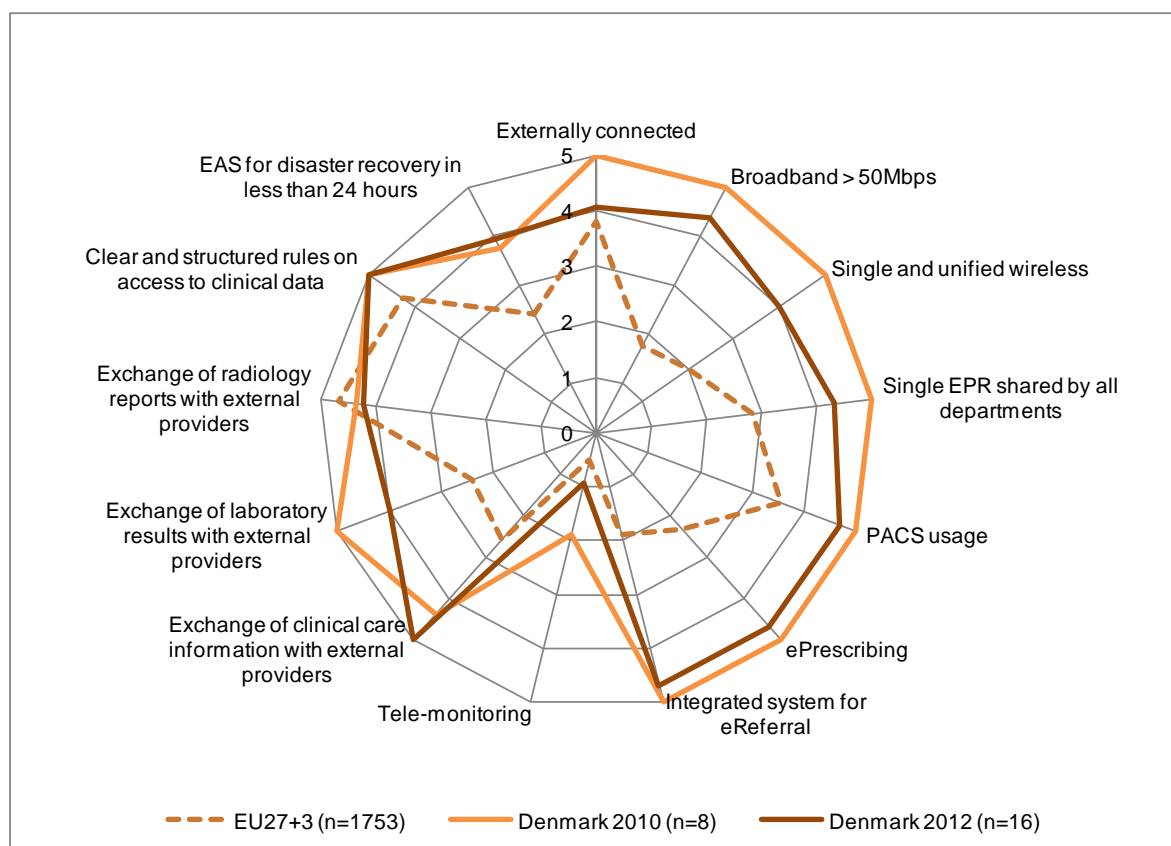
eHealth indicators - Denmark	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	5%	-19%
Broadband > 50Mbps	52%	-13%
Single and unified wireless	40%	-20%
Single EPR shared by all departments	30%	-13%
PACS usage	23%	-6%
ePrescribing	47%	-6%
Integrated system for eReferral	56%	-6%
Tele-monitoring	9%	-19%
Exchange of clinical care information with external providers	49%	13%
Exchange of laboratory results with external providers	32%	-20%
Exchange of radiology reports with external providers	-9%	-3%
Clear and structured rules on access to clinical data	15%	0%
EAS for disaster recovery in less than 24 hours	30%	4%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Danish eHealth profile in EU27+3

277   Denmark recorded strong eHealth indicators compared to the EU27+3 average. All Danish indicators were higher than European averages except for *"Exchange of radiology reports with external providers"* (-9%). The performances for *"Integrated system for eReferral"* and *"Broadband > 50Mbps"* were particularly outstanding, registering respectively 56% and 52% higher than EU27+3 scores.

Change in the Danish eHealth profile

278   The lower average scores recorded by Denmark's eHealth indicators between 2010 and 2012 can be partly explained by the doubling of the sample and its increased representativeness. Indeed, all but two eHealth indicators (*"Exchange of clinical care information with external providers"* and *"EAS for disaster recovery in less than 24 hours"*) dropped over the period under review. However, the indicator *"Clear and structured rules on access to clinical data"* remained unchanged at the maximum level. However, this negative evolution has to be seen in the context of the already high 2010 scores for all indicators.

Figure 104: Danish acute hospitals eHealth profile by ownership
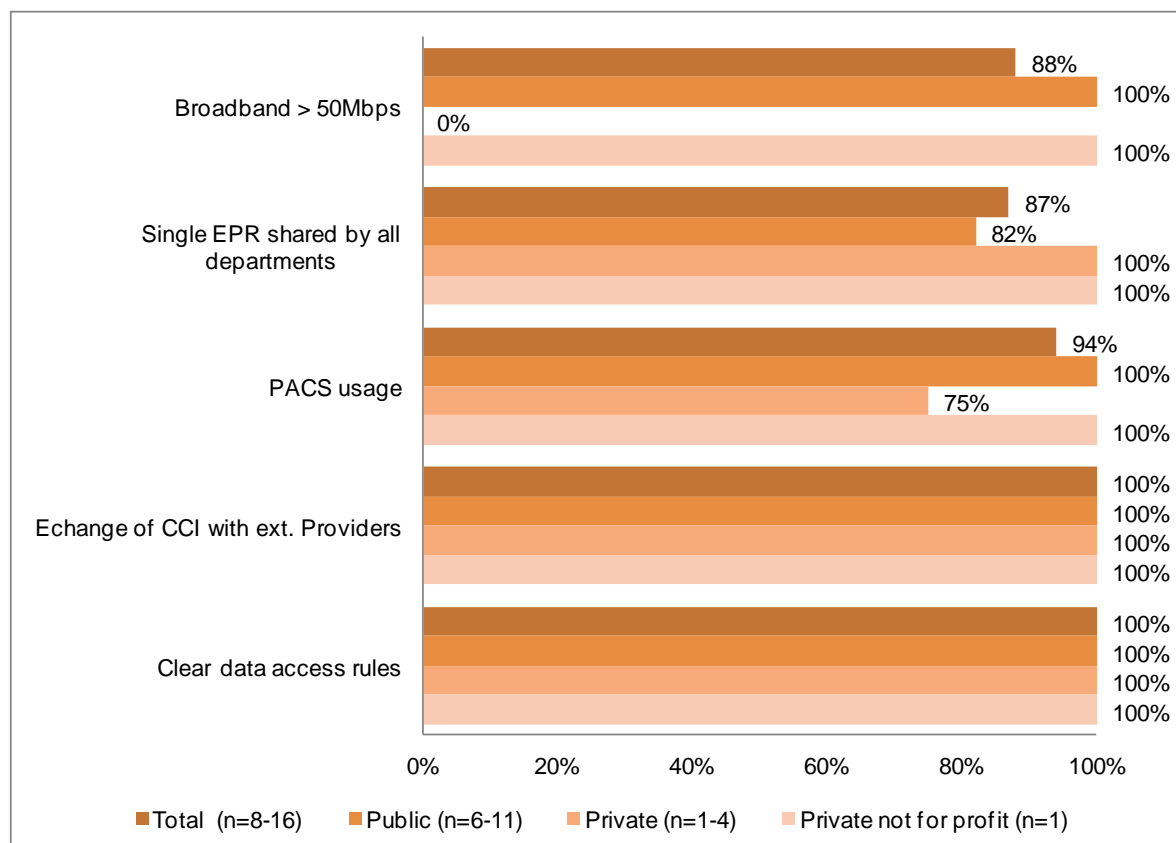
Note: Results are based on valid answers only - category bases may vary from the total reported here.

279   Danish eHealth indicators generally scored high across all ownership categories. While *"Exchange of clinical care information with external providers"* and *"Clear and structured rules on access to clinical data"* were the most widely implemented indicators across all hospital types, *"Broadband > 50Mbps"* was not implemented at all by the sole Private hospital interviewed. All the other indicators registered high implementation rates in both Private and Public hospitals (from 75% to 100%).

Figure 105: Danish acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.
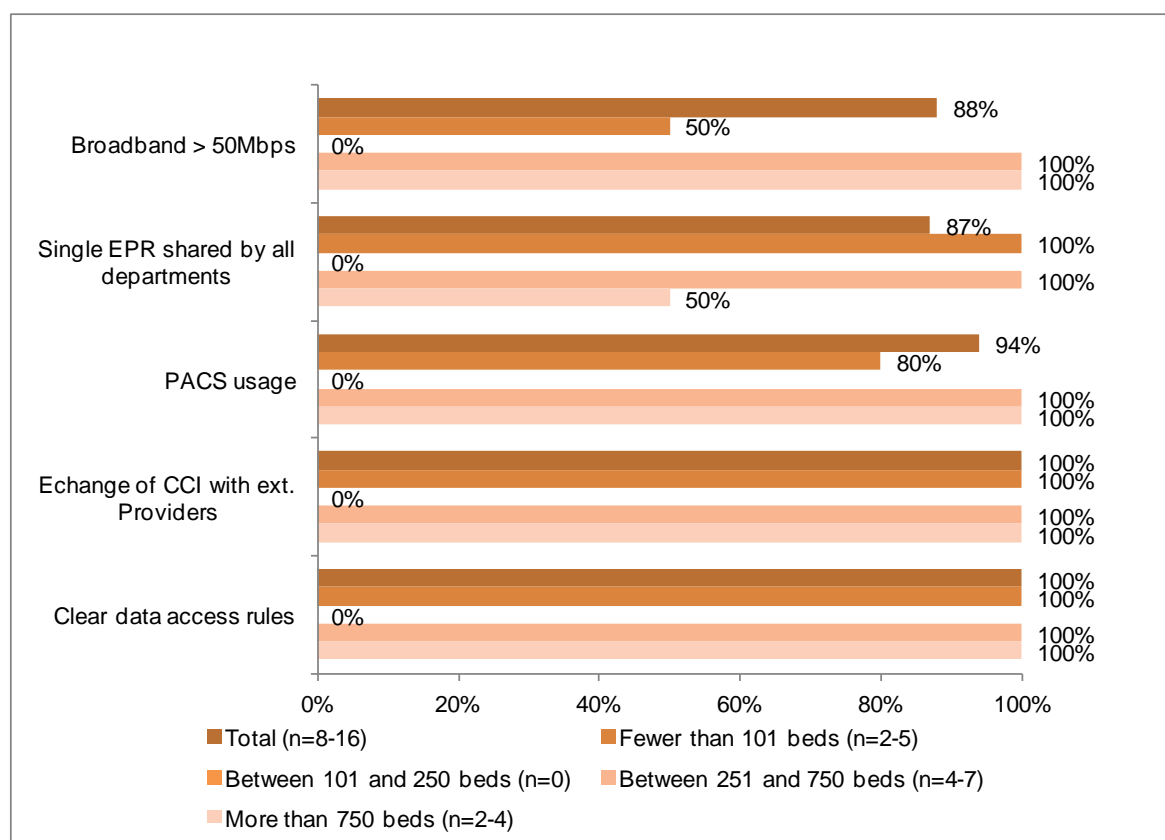
280 In terms of hospital size, none of the respondents fell into the category "Between 101 and 250 beds". "*Clear and structured rules on access to clinical data*" and "*Exchange of clinical care information with external providers*" recorded the highest implementation levels across all hospital size categories. This was followed by "*PACS usage*" (94% average score).

Figure 106: Difference between NUTS 2 level and country-level results

	Broadband > 50Mbps	Single EPR shared by all departments	PACS usage	Exchange of clinical care information with external providers	Clear and structured rules on access to clinical data
Total Denmark (n=16)	88%	87%	94%	100%	100%
DK01 - Hovedstaden (n=5)	100%	100%	100%	100%	100%
DK05 - Nordjylland (n=4)	100%	75%	100%	100%	100%

Note: Results are based on valid answers only - bases may vary from the total observations reported here. No statistically significant difference between regions and the national level (at the 95% and 99% confidence level).

281 In the context of the study, we have analysed two NUTS 2 regions for Denmark. Both the *DK01 – Hovedstaden* and *DK05 – Nordjylland* region reported full implementation of the "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*" indicators. However the results for "*Single EPR shared by all departments*" for the *DK05 – Nordjylland* region were below the national average (75% compared to 87% at national level). None of these results reached statistical significance using a 95% and 99% confidence interval.

5.2.8   Estonia's acute hospital eHealth profile

282   136 hospitals were identified in Estonia. Within this sample, 90 (66%) completed the screener part of the questionnaire and, of these, 18% qualified as acute care hospitals. Of the 25 screened in, 12 acute hospitals (48%) completed the survey.

283   The number of intermediate size hospitals has increased significantly between 2010 and 2012.

Table 21: Estonian breakdown by size of hospital

Estonia	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	25	4	10	5	4	2
		16%	40%	20%	16%	8%
2012	12	1	5	4	2	-
		8%	42%	33%	17%	-
2010	3	-	1	-	2	-
		-	33%	-	67%	-

284   The number of Public hospitals in Estonia has more than tripled between 2010 and 2012.

Table 22: Estonian breakdown by ownership type

Estonia	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	25	21	1	2	1
		84%	4%	8%	4%
2012	12	11	-	1	-
		92%	-	8%	-
2010	3	3	-	-	-
		100%	-	-	-

Figure 107: Estonian acute hospital eHealth profile
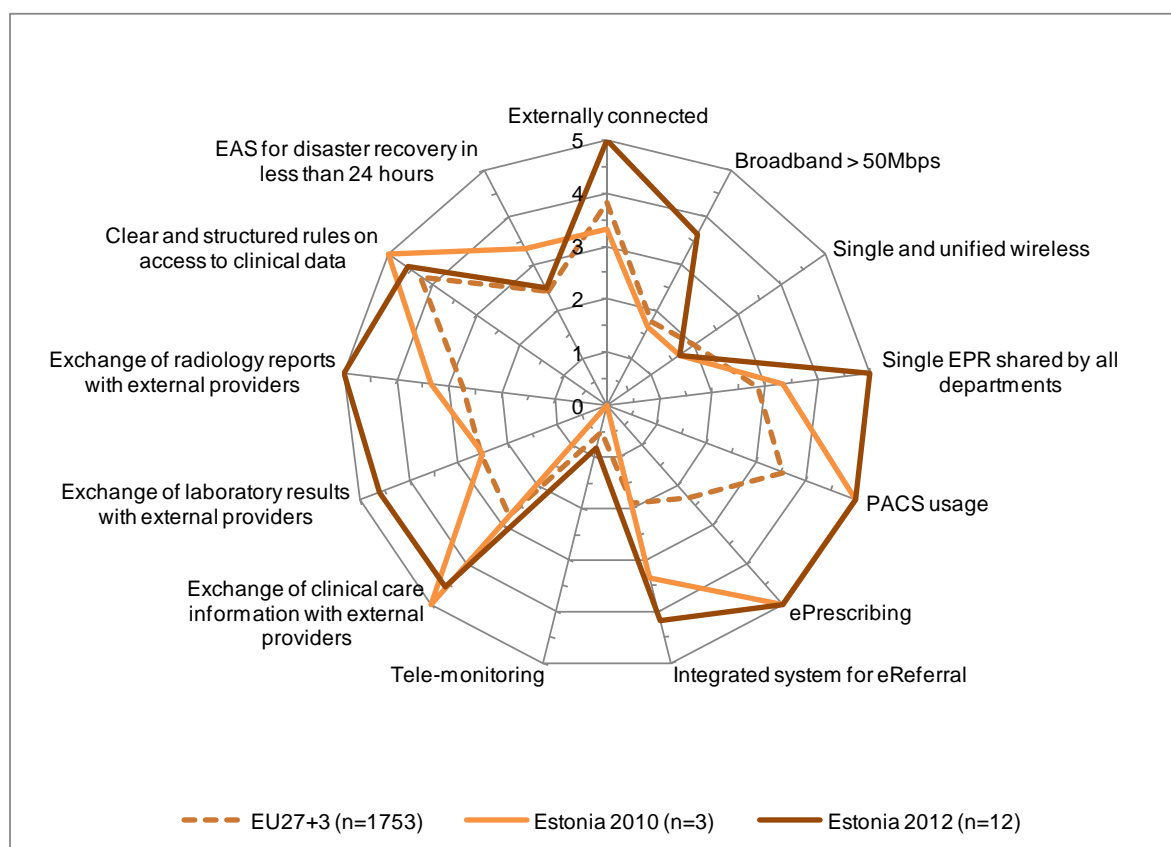
eHealth indicators - Estonia	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	24%	33%
Broadband > 50Mbps	37%	39%
Single and unified wireless	-7%	0%
Single EPR shared by all departments	43%	33%
PACS usage	29%	0%
ePrescribing	53%	0%
Integrated system for eReferral	46%	17%
Tele-monitoring	6%	17%
Exchange of clinical care information with external providers	36%	-8%
Exchange of laboratory results with external providers	40%	42%
Exchange of radiology reports with external providers	45%	33%
Clear and structured rules on access to clinical data	6%	-8%
EAS for disaster recovery in less than 24 hours	2%	-17%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Estonian eHealth profile within EU27+3

285　Estonia surpasses the EU27+3 average by at least 40% in five of the 13 eHealth indicators under review. These five areas are "*Single EPR shared by all departments*", "*ePrescribing*", "*Integrated system for eReferral*", "*Exchange of laboratory results with external providers*" and "*Exchange of radiology reports with external providers*". Only one Estonian indicator was below the European average: "*Single and unified wireless*" (-7%).

Changes in the Estonian eHealth profile

286　Estonia has grown from an already strong performance in 2010 to an even stronger eHealth position in 2012. "*Externally connected*", "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*Exchange of laboratory results with external providers*" and "*Exchange of radiology reports with external providers*" have increased by between 33% and 42% over the period.

Figure 108: Estonian acute hospitals eHealth profile by ownership
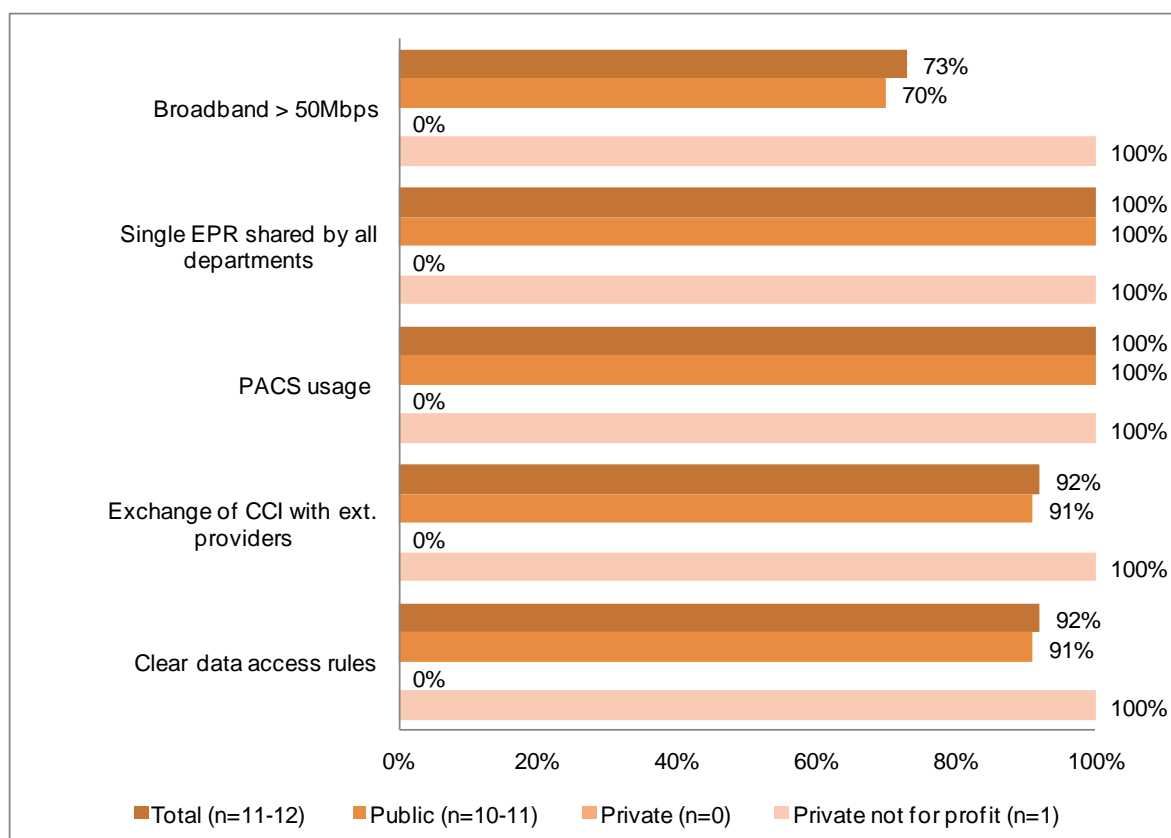
Note: Results are based on valid answers only - category bases may vary from the total reported here.

287　When looking at Public and Private not for profit acute hospitals in Estonia (Private as a category returned no values), we can see excellent penetration in all eHealth indicators under review, with the lowest values at 70% or above. In fact, four of the five categories registered scores in excess of 90%. Considerable differences were also noted between Public and Private not for profit acute hospitals in Estonia, with the sole Private not for profit hospital outperforming Public hospitals across all indicators, especially in "*Broadband > 50Mbps*" (30 percentage points). The gap is much narrower for the other indicators, amounting to 9 percentage points for both "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*".

Figure 109: Estonian acute hospitals eHealth profile by size
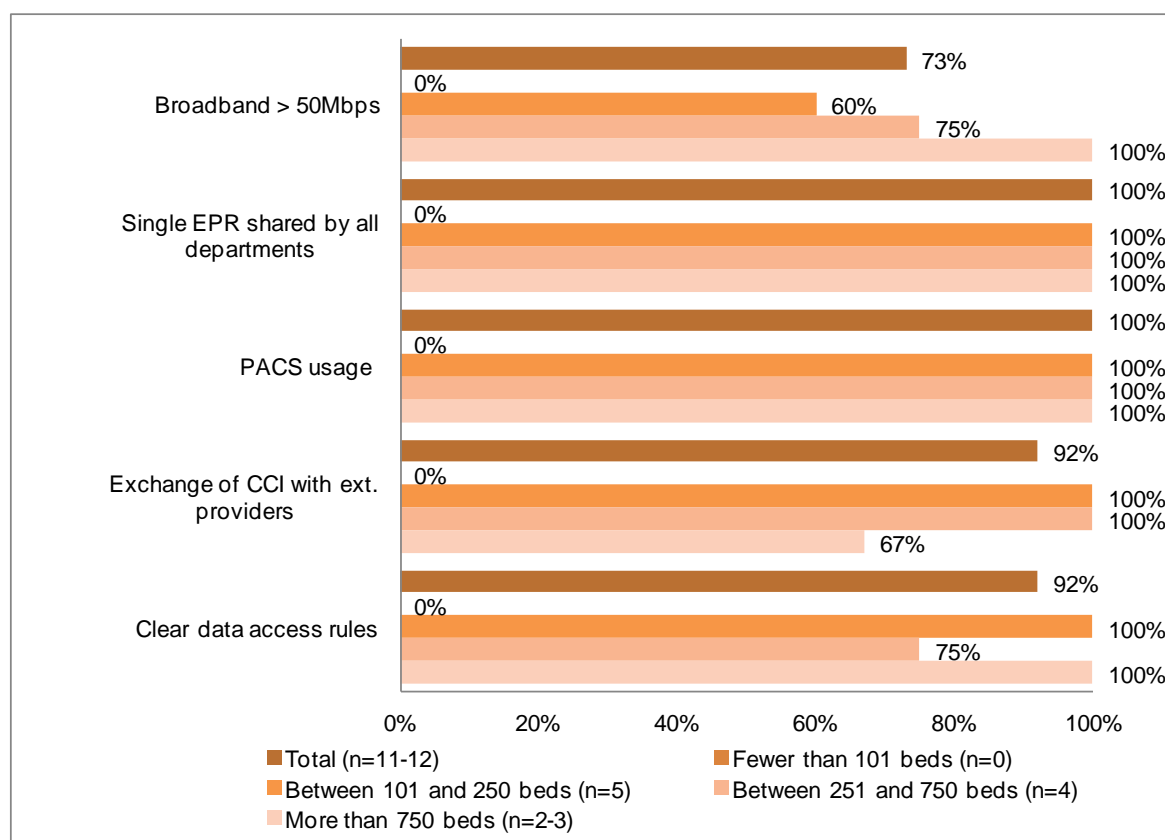
Note: Results are based on valid answers only - category bases may vary from the total reported here.

288 Estonia has returned no values for acute hospitals with under 101 beds. However, two of the five indicators ("*Single EPR shared by all departments*" and "*PACS usage*") were fully implemented across the remaining categories. After this we can see no clear pattern, as for the remaining three categories, being "*Broadband > 50Mbps*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*", we can see each segment of the acute hospital population as divided by scale underperforms in at least one category out of five.

5.2.9 Finland's acute hospital eHealth profile

289 620 hospitals were identified in Finland. Within this sample, 486 (78%) completed the screener part of the questionnaire and, of these, 7% qualified as acute care hospitals. Of the 46 screened in, 26 acute hospitals (57%) completed the survey.

290 The breakdown by hospital size has not changed significantly between 2010 and 2012.

Table 23: Finnish breakdown by size of hospital

Finland	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	46	10	18	6	2	10
		22%	39%	13%	4%	22%
2012	26	4	12	4	1	5
		15%	46%	15%	4%	19%
2010	15	3	7	5	-	-
		20%	47%	33%	-	-

The breakdown by ownership type has not changed significantly between 2010 and 2012.

Table 24: Finnish breakdown by ownership type

Finland	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	46	39	5	-	2
		85%	11%	-	4%
2012	26	24	2	-	-
		92%	8%	-	-
2010	15	15	-	-	-
		100%	-	-	-

Figure 110: Finnish acute hospital eHealth profile
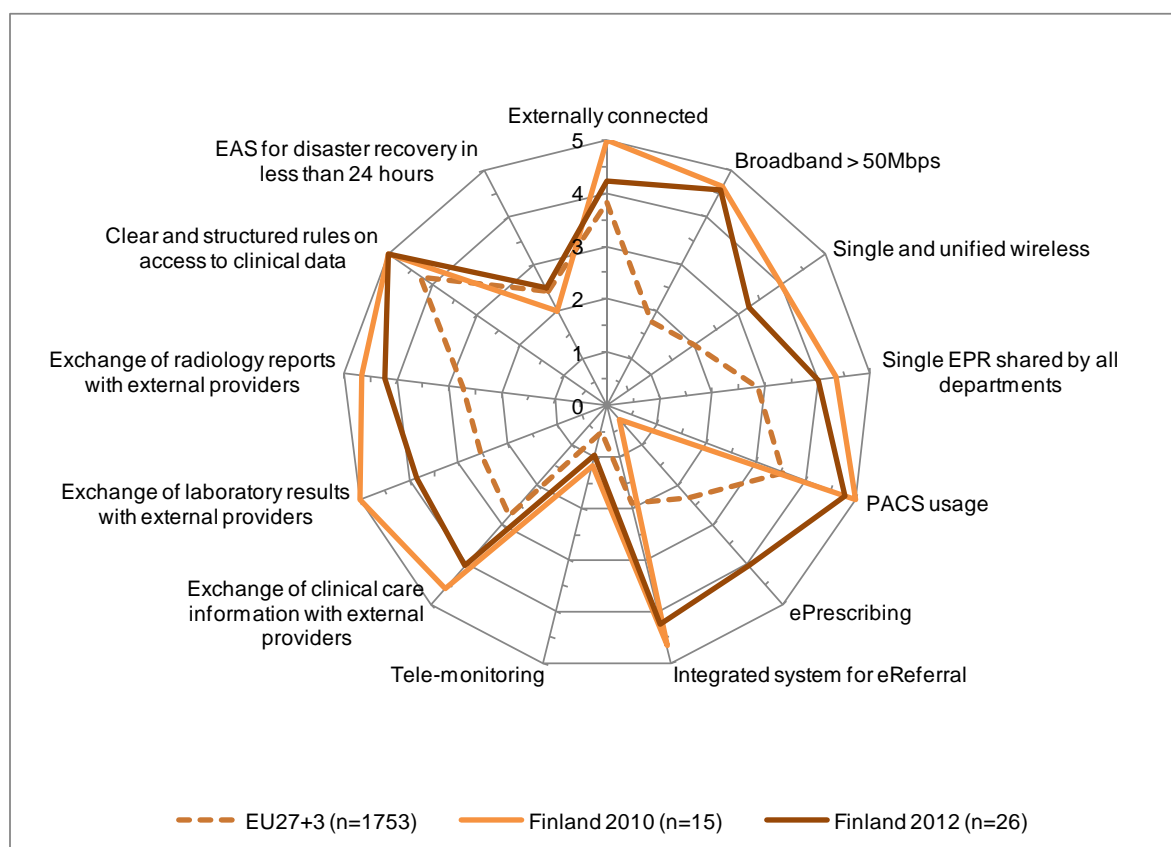
eHealth indicators - Finland	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	8%	-15%
Broadband > 50Mbps	56%	-2%
Single and unified wireless	25%	-15%
Single EPR shared by all departments	23%	-7%
PACS usage	25%	-4%
ePrescribing	34%	74%
Integrated system for eReferral	47%	-9%
Tele-monitoring	9%	-4%
Exchange of clinical care information with external providers	25%	-12%
Exchange of laboratory results with external providers	26%	-23%
Exchange of radiology reports with external providers	29%	-9%
Clear and structured rules on access to clinical data	15%	0%
EAS for disaster recovery in less than 24 hours	2%	10%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Finnish eHealth profile in EU27+3

291   Finland's eHealth profile in the European context can be currently considered to be excellent. It displays high value positive difference in every single one of the 13 values examined – essentially outperforming the EU average in all areas. In addition to this, Finland's outperformance is relatively evenly distributed. The two highest performing areas, "*Broadband > 50Mbps*" and "*Integrated system for eReferral*" score 56% and 47% respectively.

Change in the Finnish eHealth profile

292   Less positive for Finland is the decrease in eHealth values in the overall period between 2010 and 2012: it has in fact recorded negative growth in 11 of 13 areas. Mostly the negative growth has been less than – 15%; however the sharp increase in the area of "*ePrescribing*" (74% growth) and to a lesser extent "*EAS for disaster recovery in less than 24 hours*" (10% growth) have been enough to offset the losses in other categories.

Figure 111: Finnish acute hospitals eHealth profile by ownership
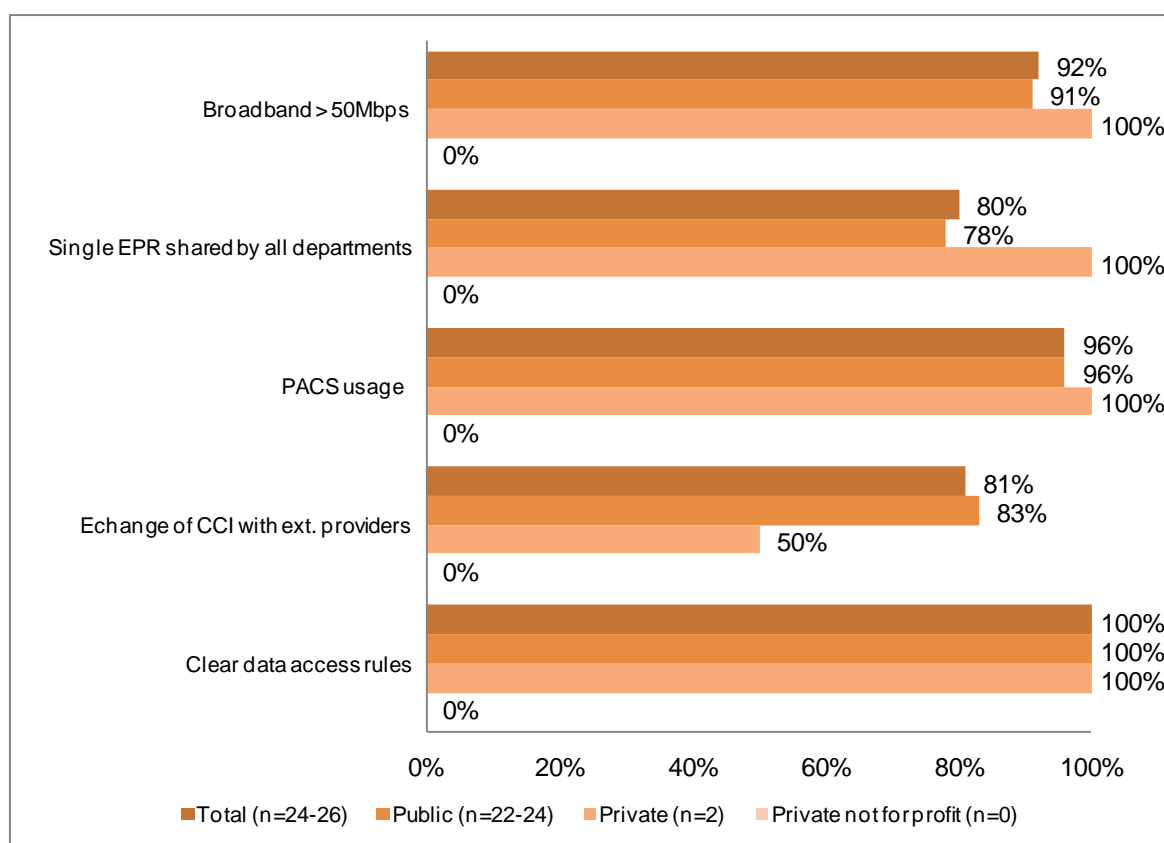
Note: Results are based on valid answers only - category bases may vary from the total reported here.

293   Finland has returned values for only two of our three categories of acute hospital, with Private not for profit not represented in any of the eHealth areas we examined. Of the two categories remaining, Finnish Private hospitals outperform their Public counterparts in four of the five areas under examination, scoring 100% penetration on "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*PACS usage*" and "*Clear and structured rules on access to clinical data*". Public hospitals, by contrast, range from 78% to 96% in four of five categories, retuning a 100% score only in "*Clear and structured rules on access to clinical data*".
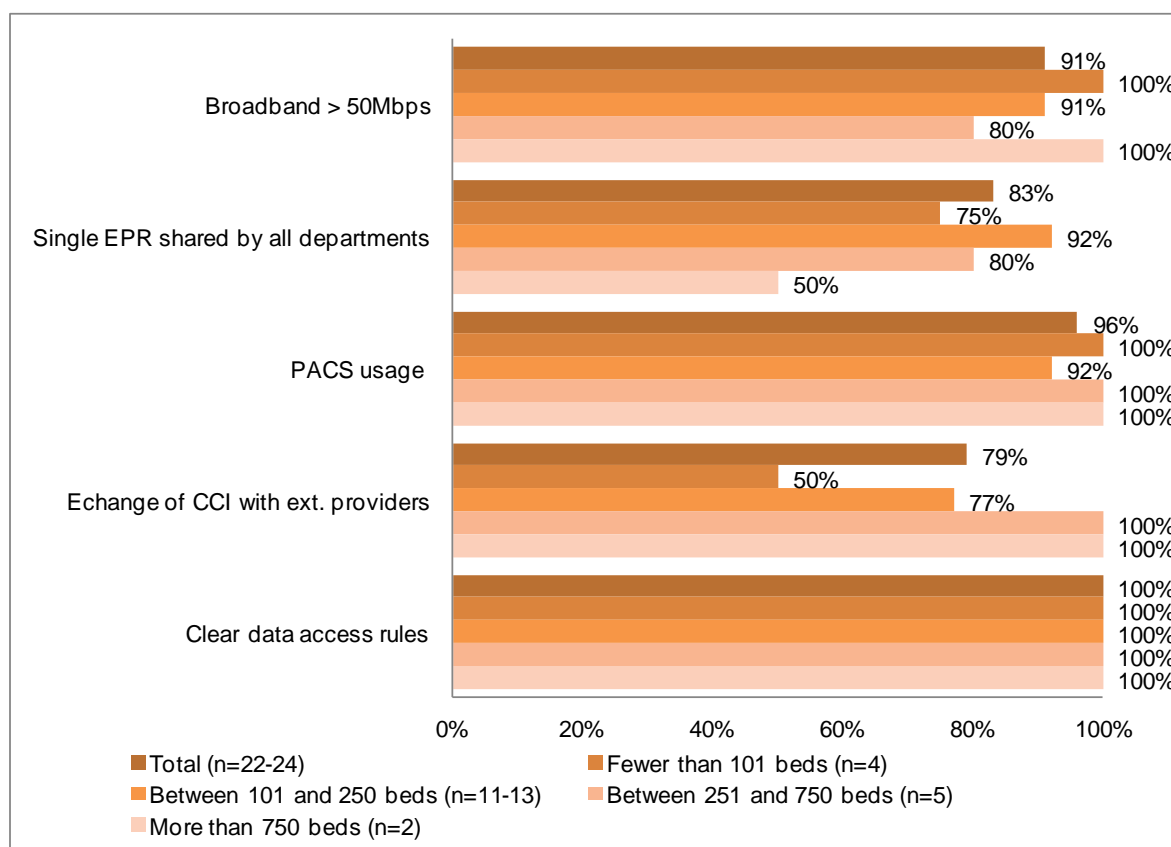
Figure 112: Finnish acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.

294   A definite scale advantage appears to be relevant when examining Finnish acute hospitals in terms of size. Hospitals which have in excess of 750 beds score 100% in four of five categories, while hospitals with between 251 and 750 beds score 100% in three of five categories. Unusually, hospitals with fewer than 101 beds also score 100% in three of five categories, however the next largest segment (between 101 and 250 beds) only scores 100% in a single category. Also, there are wide variations in scores for two areas, "*Single EPR shared by all departments*" and "*Exchange of clinical care information with external providers*", in which values range from 50% to 100%, but with no pattern evident.

5.2.10 France's acute hospital eHealth profile

295   7649 hospitals were identified in France. Within this sample, 2461 (32%) completed the screener part of the questionnaire and, of these, 13% qualified as acute care hospitals. Of the 997 screened in, 319 acute hospitals (32%) completed the survey.

296   The breakdown by size between 2010 and 2012 has especially seen the increase of the biggest size categories of hospitals.

Table 25: French breakdown by size of hospital

France	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	997	140	225	322	145	165
		14%	23%	32%	15%	17%
2012	319	63	90	108	33	25
		20%	28%	34%	10%	8%
2010	150	46	59	41	4	-
		31%	39%	27%	3%	-

297   Both private and public hospitals have significantly increased the number of hospitals in the breakdown by ownership type.

Table 26: French breakdown by ownership type

France	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	997	718	143	72	64
		72%	14%	7%	6%
2012	319	241	44	32	2
		76%	14%	10%	1%
2010	150	76	18	53	3
		51%	12%	35%	2%

Figure 113: French acute hospital eHealth profile
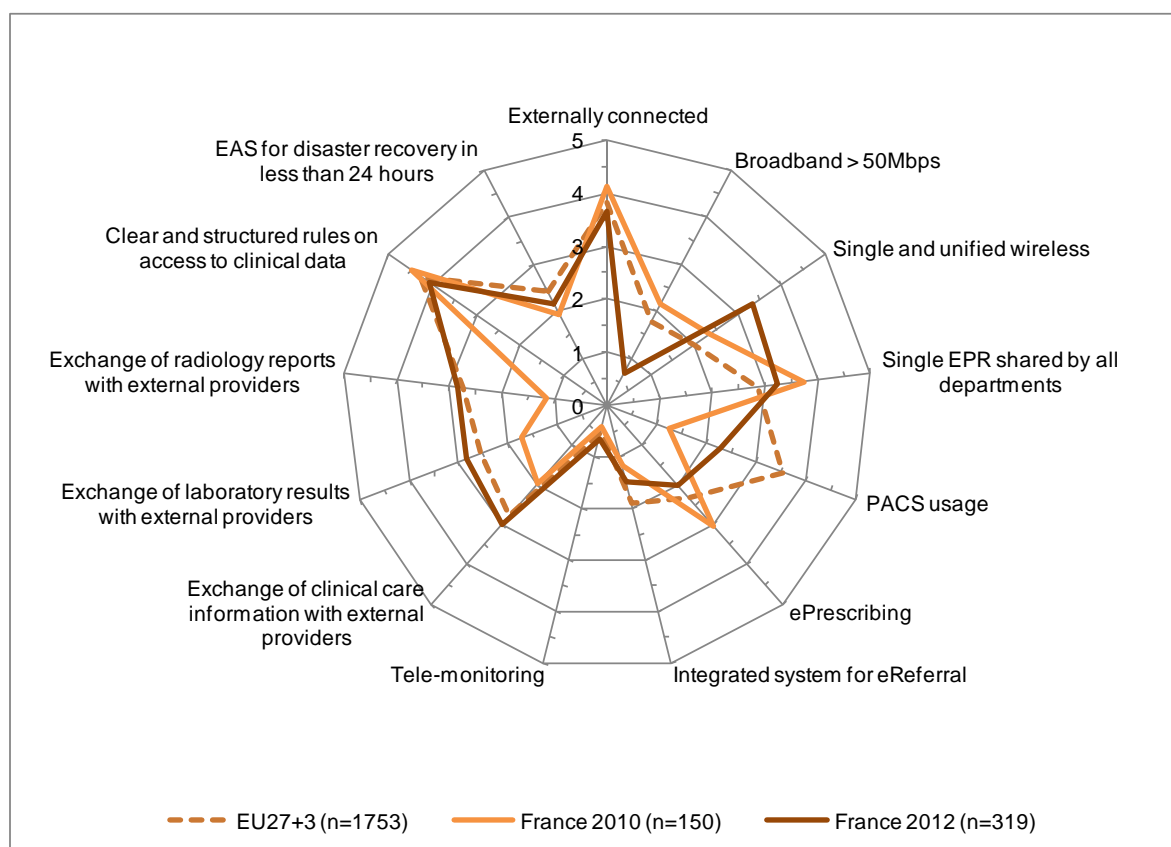
eHealth indicators - France	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-3%	-10%
Broadband > 50Mbps	-21%	-29%
Single and unified wireless	27%	19%
Single EPR shared by all departments	8%	-10%
PACS usage	-25%	21%
ePrescribing	-6%	-20%
Integrated system for eReferral	-8%	6%
Tele-monitoring	3%	5%
Exchange of clinical care information with external providers	4%	20%
Exchange of laboratory results with external providers	5%	22%
Exchange of radiology reports with external providers	1%	34%
Clear and structured rules on access to clinical data	-4%	-8%
EAS for disaster recovery in less than 24 hours	-5%	5%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the French eHealth profile within EU27+3

298   France is slightly behind the European average of eHealth implementation. Despite this, there are no large outliers, with only two areas "*Broadband > 50Mbps*" and "*PACS usage*" registering a negative value in excess of -20%. The remainder of the areas in which France lags are marginal. However, the same is true in the categories in which France has grown in relation to the European average, with marginal positive values recorded in only six areas. Of these areas only one, "*Single and unified wireless*" saw substantial growth, at 27%.

Changes in the French eHealth profile

299   While France has generally increased its eHealth profile since 2010, the increase has been low. This growth has come predominantly from four areas, "*PACS usage*", "*Exchange of clinical care information with external providers*", "*Exchange of laboratory results with external providers*" and "*Exchange of radiology reports with external providers*", which all posted growth values in excess of 20%.

Figure 114: French acute hospitals eHealth profile by ownership
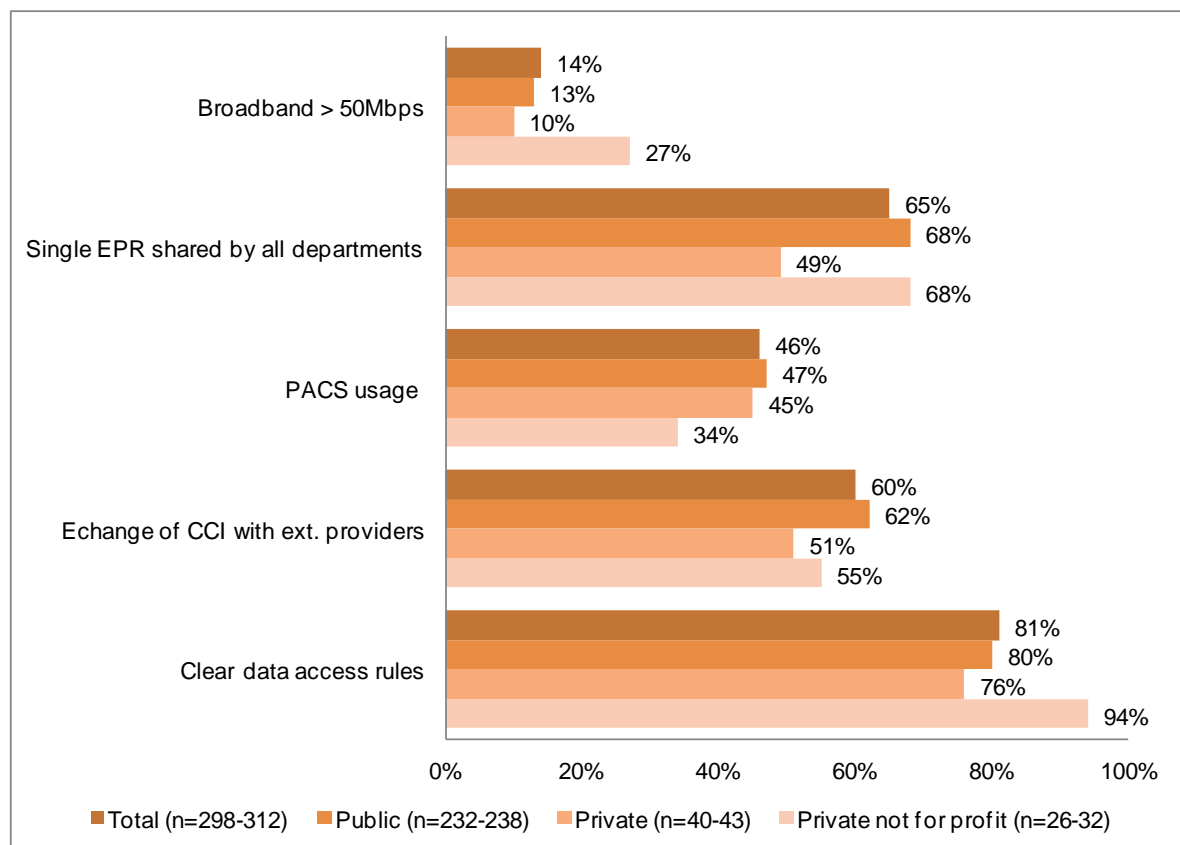
Note: Results are based on valid answers only - category bases may vary from the total reported here.

300   Ownership type does not appear to very important to the development of eHealth in French acute hospitals. For example, while Public and Private not for profit hospital categories lead in three of five categories each (Public hospitals lead in "*Single EPR shared by all departments*", "*PACS usage*" and "*Exchange of clinical care information with external providers*", while Private not for profit hospitals lead in "*Broadband > 50Mbps*", "*PACS usage*" and "*Clear and structured rules on access to clinical data*"), the lead values tend not to vary widely. For example, no hospital type leads its counterparts by more than 19% in any eHealth area.
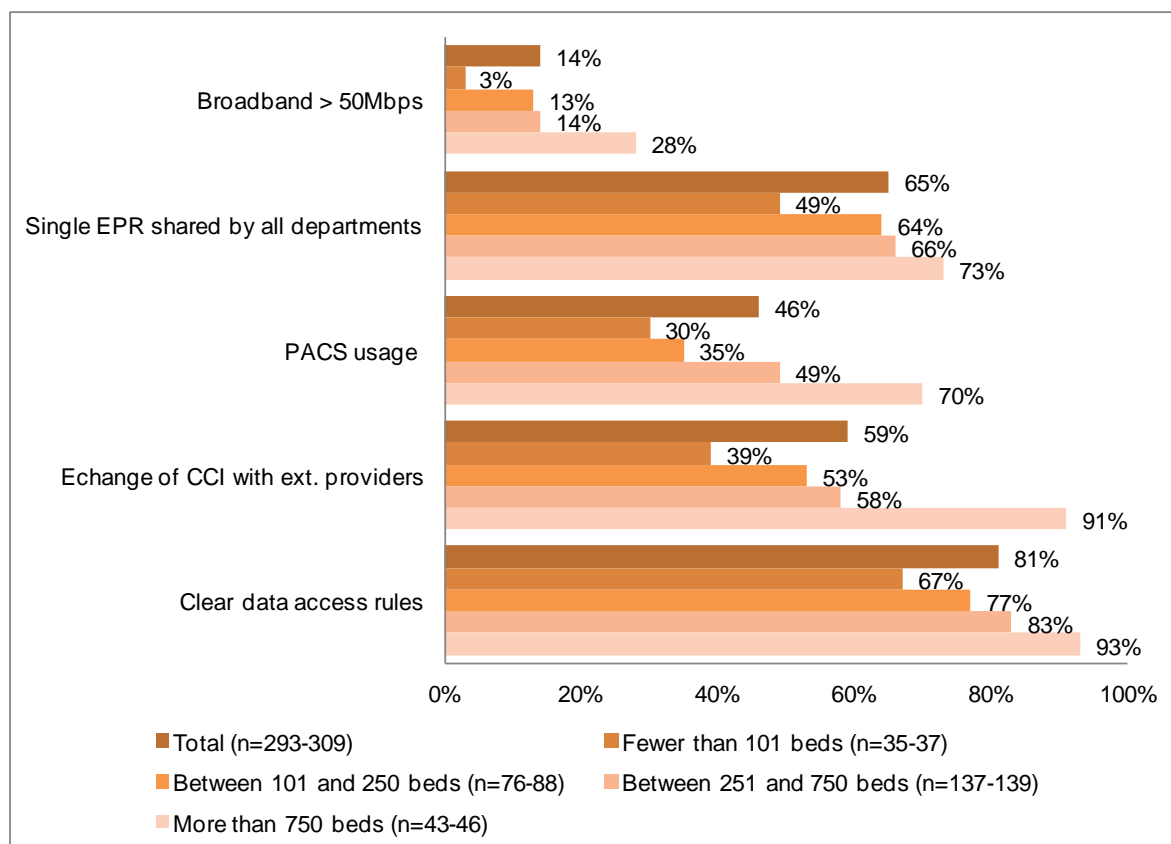
Figure 115: French acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.

301   In contrast to ownership type (see above), when scale considerations are taken into account, we can see that a very definite advantage is enjoyed by French acute hospitals which have more than 750 beds. This category of hospital leads in all five areas examined, and additionally leads by significant margins in three of these categories (14% in "*Broadband > 50Mbps*", 24% in "*PACS usage*" and 32% in "*Exchange of clinical care information with external providers*"). Even more significantly, the link between increased scale and greater eHealth capabilities is evident in all the categories, with smaller hospital segments recording progressively lower capabilities in each category under review.

5.2.11   Germany's acute hospital eHealth profile

302   3847 hospitals were identified in Germany. Within this sample, 2354 (61%) completed the screener part of the questionnaire and, of these, 34% qualified as acute care hospitals. Of the 1295 screened in, 201 acute hospitals (16%) completed the survey.

303   The breakdown by size between 2010 and 2012 remains approximately the same with a higher increase in the number of hospitals of the intermediate size categories.

Table 27: German breakdown by size of hospital

Germany	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	1295	193	411	486	117	88
		15%	32%	38%	9%	7%
2012	201	43	68	71	16	3
		21%	34%	35%	8%	1%
2010	150	36	58	45	11	-
		24%	39%	30%	7%	-

304   While private and private not for profit hospitals have increased in number between 2010 and 2012, the number of public hospitals has decreased by 20 units over the same period.

Table 28: German breakdown by ownership type

Germany	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	1295	387	357	373	178
		30%	28%	29%	14%
2012	201	70	59	56	16
		35%	29%	28%	8%
2010	150	90	33	26	1
		60%	22%	17%	1%

Figure 116: German acute hospital eHealth profile

eHealth indicators - Germany	score difference 2012-Eu27+3	score difference 2012-2010
Externally connected	8%	-2%
Broadband > 50Mbps	-5%	-10%
Single and unified wireless	-13%	4%
Single EPR shared by all departments	6%	1%
PACS usage	6%	13%
ePrescribing	-37%	3%
Integrated system for eReferral	-15%	13%
Tele-monitoring	-7%	2%
Exchange of clinical care information with external providers	-2%	22%
Exchange of laboratory results with external providers	-14%	11%
Exchange of radiology reports with external providers	6%	23%
Clear and structured rules on access to clinical data	6%	-5%
EAS for disaster recovery in less than 24 hours	7%	-6%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the German eHealth profile within EU27+3

305 Germany has failed to reach the European average in terms of eHealth adoption. The most notable lag occurs in the area of "*ePrescribing*" which is 9% behind the European average. In all other areas, the lag is marginal at 4% or less in each category. The specific categories which are behind the European average are "*Broadband > 50Mbps*", "*Single and unified wireless*", "*ePrescribing*", "*Integrated system for eReferral*", "*Tele-monitoring*", "*Exchange of clinical care information with external providers*", "*Exchange of laboratory results with external providers*".

Change in the German eHealth profile

306 Other than for "*Exchange of clinical care information with external providers*" and "*Exchange of radiology reports with external providers*" (which gained 22% and 23% respectively over the period under review), all gains have been marginal and lower than 15% in each category.

Figure 117: German acute hospitals eHealth profile by ownership
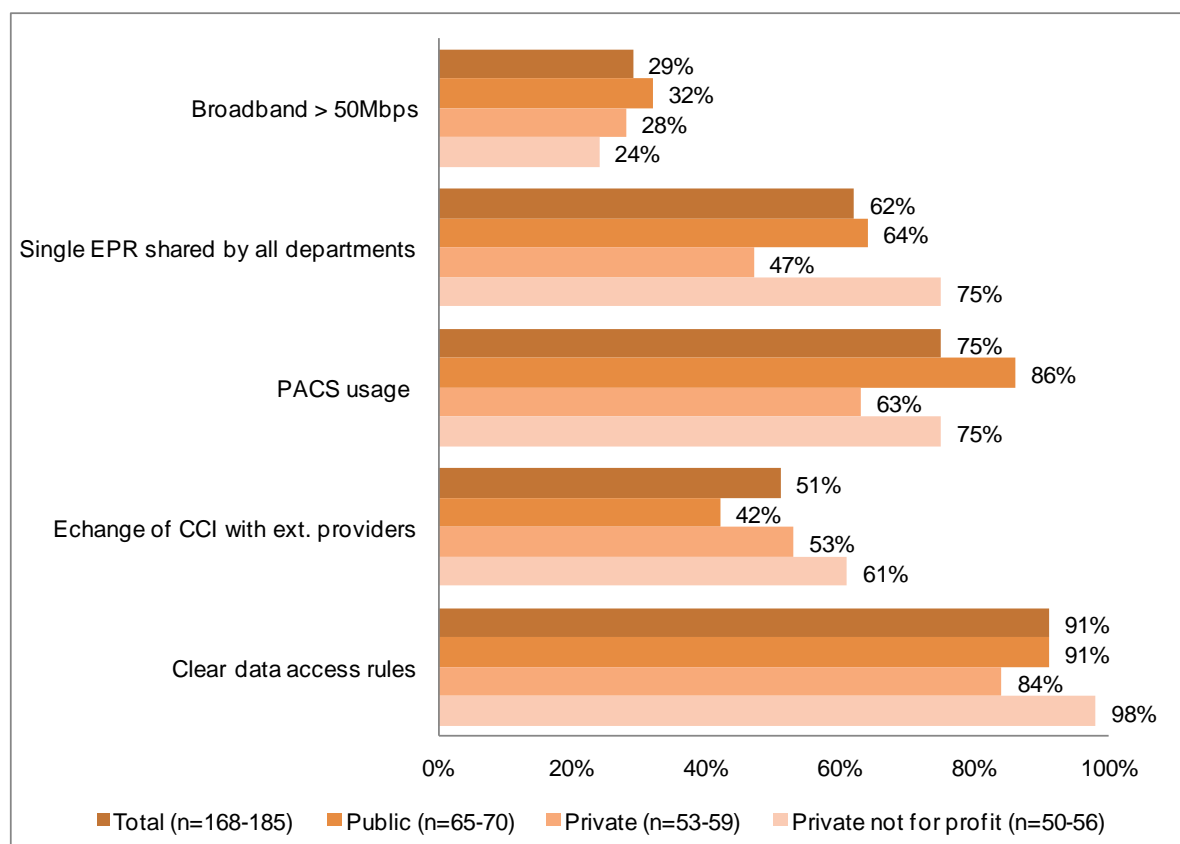
Note: Results are based on valid answers only - category bases may vary from the total reported here.

307 Public hospitals in Germany lead in two of the five areas investigated, namely "*Broadband > 50Mbps*" and "*PACS usage*". Private acute hospitals, by contrast, underperform in all five areas, most notably in "*Single EPR shared by all departments*" where Private hospitals have only 47% penetration, a full 28 percentage points behind the lead value of 75%. Private not for profit acute hospitals lead in three areas, "*Single EPR shared by all departments*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*".
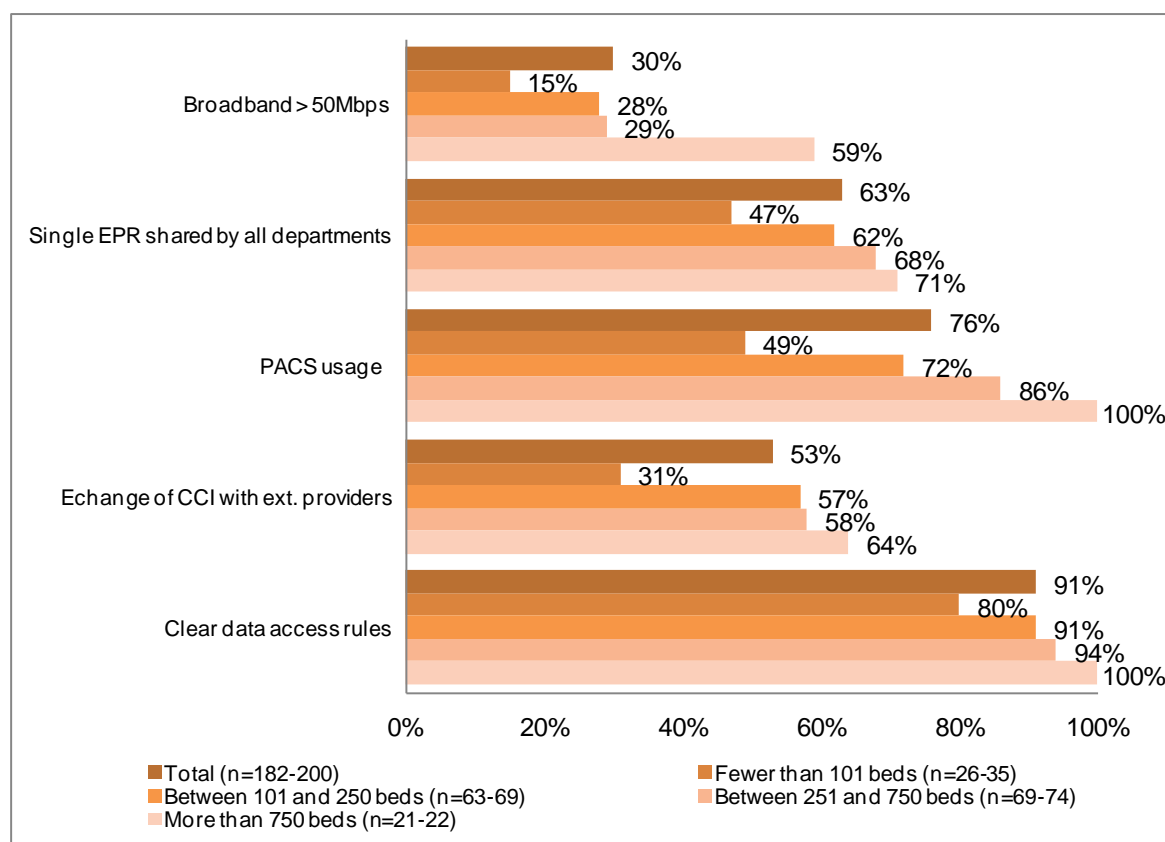
Figure 118: German acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.

308   In Germany, scale advantages can be observed across all eHealth indicators under review. In all five areas, "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*", acute hospitals over 750 beds in size led. For smaller size segments, the ranking is also commensurate with scale: the larger the hospital, the better it is equipped for eHealth (although in some cases the advantage was marginal).

Figure 119: Difference between NUTS 1 level and country-level results

Regions	Broadband > 50Mbps	Single EPR shared by all departments	PACS usage	Exchange of clinical care information with external providers	Clear and structured rules on access to clinical data
Total Germany (n=201)	31%	63%	77%	54%	91%
DE1 - BADEN-WÜRTTEMBERG (n=29)	43%	62%	72%	65%	93%
DE2 - BAYERN (n=49)	22%	59%	73%	45%	90%
DE3 - BERLIN (n=4)	50%	67%	50%	33%	100%
DE4 - BRANDENBURG (n=5)	-	60%	100%	40%	100%
DE6 - HAMBURG (n=4)	50%	100%	100%	50%	100%
DE7 - HESSEN (n=16)	20%	62%	75%	40%	87%
DE8 - MECKLENBURG-VORPOMMERN (n=3)	33%	50%	100%	67%	100%
DE9 - NIEDERSACHSEN (n=19)	28%	50%	74%	53%	78%
DEA - NORDRHEIN-WESTFALEN (n=37)	38%	74%	73%	51%	91%
DEB - RHEINLAND-PFALZ (n=8)	-	43%	88%	43%	100%
DEC - SAARLAND (n=1)	100%	-	100%	100%	100%
DED - SACHSEN (n=6)	33%	50%	100%	50%	100%
DEE - SACHSEN-ANHALT (n=4)	50%	75%	100%	75%	75%
DEF - SCHLESWIG-HOLSTEIN (n=10)	33%	67%	70%	90%	100%
DEG - THÜRINGEN (n=6)	20%	83%	83%	80%	100%

Note: Results are based on valid answers only - bases may vary from the total observations reported here. No statistically significant difference between regions and the national level (at the 95% and 99% confidence level).

309   In the context of the study, we have analysed 16 NUTS 1 regions for Germany. Two regions, *DE6 –
Hamburg* and *DEC – Saarland*, scored the highest, scoring on average 80% and 100% at combined level.
DE6 – Hamburg scored 50% in "*Broadband > 50Mbps*", 50% in "*Exchange of clinical care information with
external providers*" and 100% "*Single EPR shared by all departments*", "*PACS usage*" and "*Clear and
structured rules on access to clinical data*". *DEC – Saarland* by contrast scored 100% in four areas
"*Broadband >50 Mbps*", "*PACS usage*", "*Exchange of clinical care information with external providers*" and
"*Clear and structured rules on access to clinical data*" but zero for "*Single EPR shared by all departments*",
although this region is represented by only one hospital.

5.2.12   Greece's acute hospital eHealth profile

310   687 hospitals were identified in Greece. Within this sample, 398 (58%) completed the screener part of the
questionnaire and, of these, 17% qualified as acute care hospitals. Of the 120 screened in, 68 acute
hospitals (57%) completed the survey.

311   The breakdown by size points to a significant increase in the number of hospitals with fewer than 101
beds and with between 251 and 750 beds between 2010 and 2012.

**Table 29: Greek breakdown by size of hospital**

Greece	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	120	32	28	25	3	32
		27%	23%	21%	3%	27%
2012	68	18	16	18	2	14
		26%	24%	26%	3%	21%
2010	26	5	11	7	3	-
		19%	42%	27%	12%	-

312   The number of Greek public and private hospitals has increased significantly between 2010 and 2012.

Table 30: Greek breakdown by ownership type

Greece	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	120	85	20	1	14
		71%	17%	1%	12%
2012	68	59	8	1	-
		87%	12%	1%	-
2010	26	24	1	1	-
		92%	4%	4%	-

Figure 120: Greek acute hospital eHealth profile
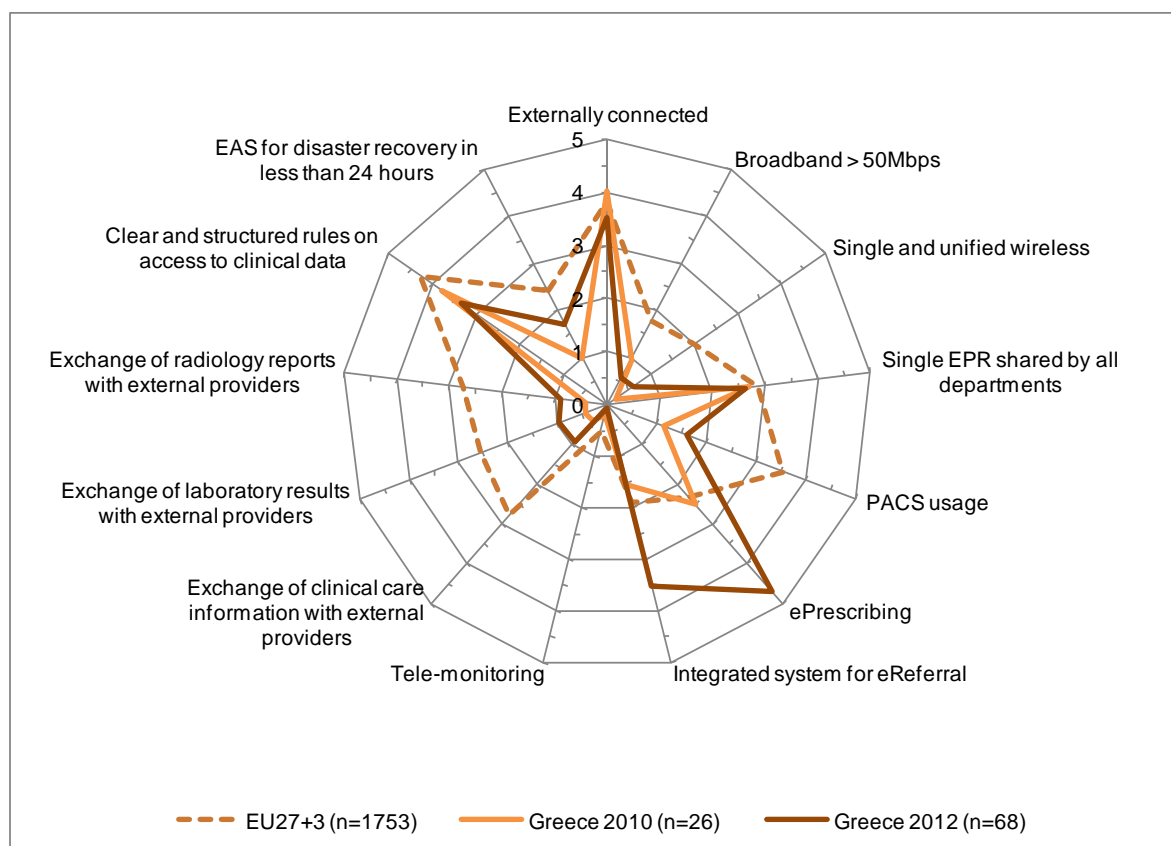
eHealth indicators - Greece	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-6%	-11%
Broadband > 50Mbps	-24%	-8%
Single and unified wireless	-28%	8%
Single EPR shared by all departments	-5%	-1%
PACS usage	-39%	9%
ePrescribing	47%	44%
Integrated system for eReferral	33%	40%
Tele-monitoring	-9%	-3%
Exchange of clinical care information with external providers	-37%	10%
Exchange of laboratory results with external providers	-32%	11%
Exchange of radiology reports with external providers	-38%	9%
Clear and structured rules on access to clinical data	-18%	-9%
EAS for disaster recovery in less than 24 hours	-14%	14%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Greek eHealth profile in EU27+3

313   Greece is significantly behind the European average in terms of eHealth development. The areas which contribute the most to this lag are "*PACS usage*" (-39%), "*Exchange of clinical care information with external providers*" (-37%), "*Exchange of laboratory results with external providers*", (-32%) and "*Exchange of radiology reports with external providers*" (-38%). Greece, however, exceeds the European average in "*ePrescribing*" (47%) and "*Integrated system for eReferral*" (33%).

Change in the Greek eHealth profile

314   Despite lagging behind the European average, Greece has in fact made significant progress over its previous eHealth profile as evaluated in 2010. The country improvements are mainly due to the two areas in which it exceeds the average, "*ePrescribing*" and "*Integrated system for eReferral*".
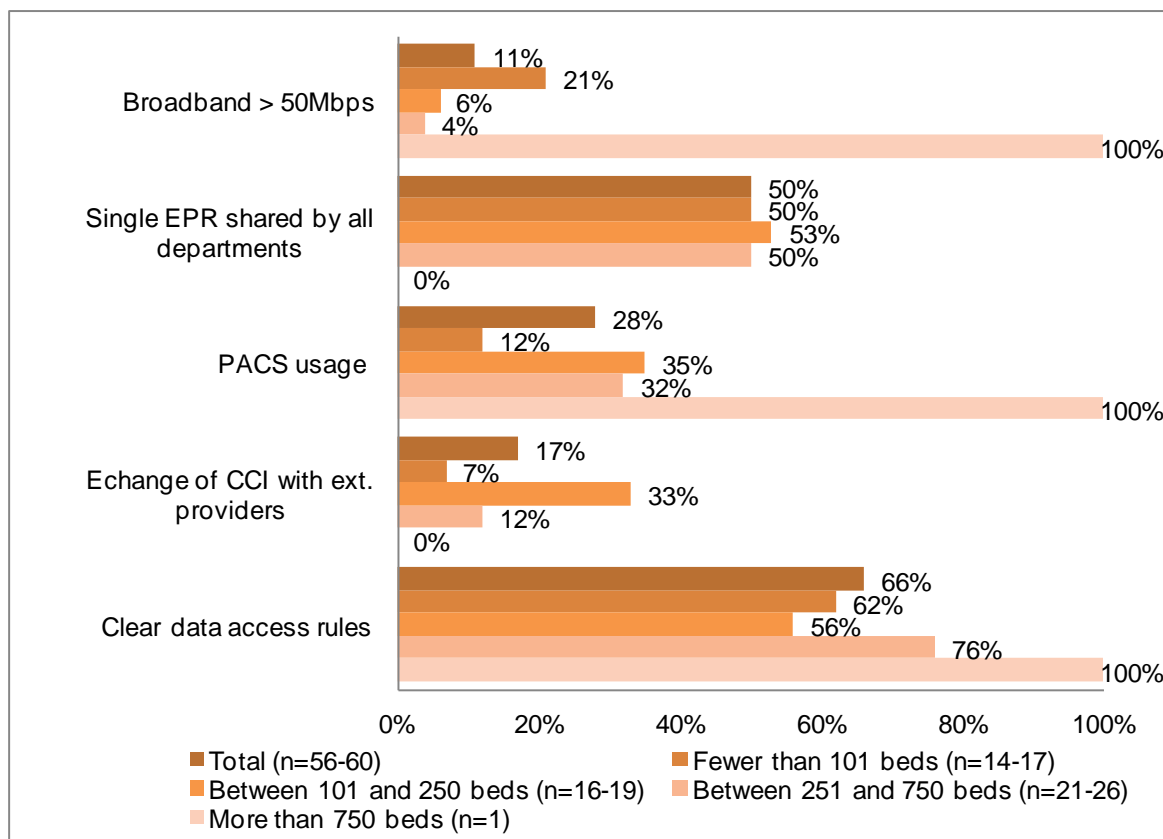
Figure 121: Greek acute hospitals eHealth profile by ownership
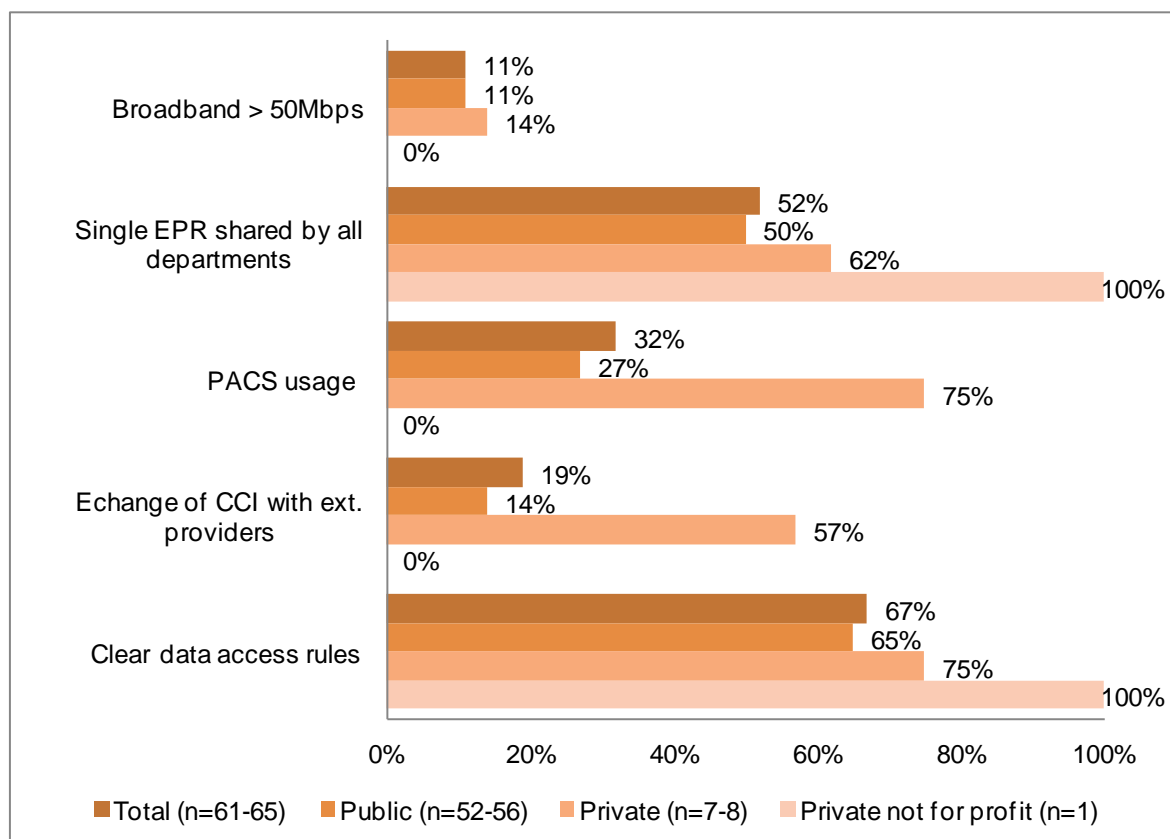
Note: Results are based on valid answers only - category bases may vary from the total reported here.

315   Greece's Public acute hospitals underperform in all areas examined and consistently rank equal to or behind the average values for all indicators. Private hospitals fare much better, exceeding the average value in all areas, sometimes by a wide margin, for example in "*PACS usage*". Finally, the sole Private not for profit acute hospital returned values for only two of three areas ("*Single EPR shared by all departments*" and "*Clear and structured rules on access to clinical data*"), but displays 100% penetration in these areas.

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Figure 122: Greek acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.

316 Considering the scale of acute hospitals in Greece, we can see that the only hospital with more than 750 beds has "*Broadband > 50Mbps*", "*Single EPR shared by all departments*" and "*Clear and structured rules on access to clinical data*". In addition to the high penetration of these eHealth services in hospitals with above 750 beds, the gap in relation to other hospital sizes is considerable, ranging from 44 to 96 percentage points between the highest performer and the lowest performer.

5.2.13 Hungary's acute hospital eHealth profile

317 492 hospitals were identified in Hungary. Within this sample, 279 (57%) completed the screener part of the questionnaire and, of these, 21% qualified as acute care hospitals. Of the 102 screened in, 43 acute hospitals (42%) completed the survey.

318 The intermediate size categories experienced a significant increase in the number of hospitals between 2010 and 2012.

**Table 31: Hungarian breakdown by size of hospital**

Hungary	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	102	15	20	34	23	10
		15%	20%	33%	23%	10%
2012	43	6	7	17	8	5
		14%	16%	40%	19%	12%
2010	10	-	2	7	1	-
		-	20%	70%	10%	-

319 The number of Public hospitals has increased from nine to 40 between 2010 and 2012. The Private and Private not for profit categories each counted only one hospital in 2012 (compared to 0 in 2010).

Table 32: Hungarian breakdown by ownership type

Hungary	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	102	90	7	1	4
		88%	7%	1%	4%
2012	43	40	1	1	1
		93%	2%	2%	2%
2010	10	9	-	-	1
		90%	-	-	10%

169

Figure 123: Hungarian acute hospital eHealth profile
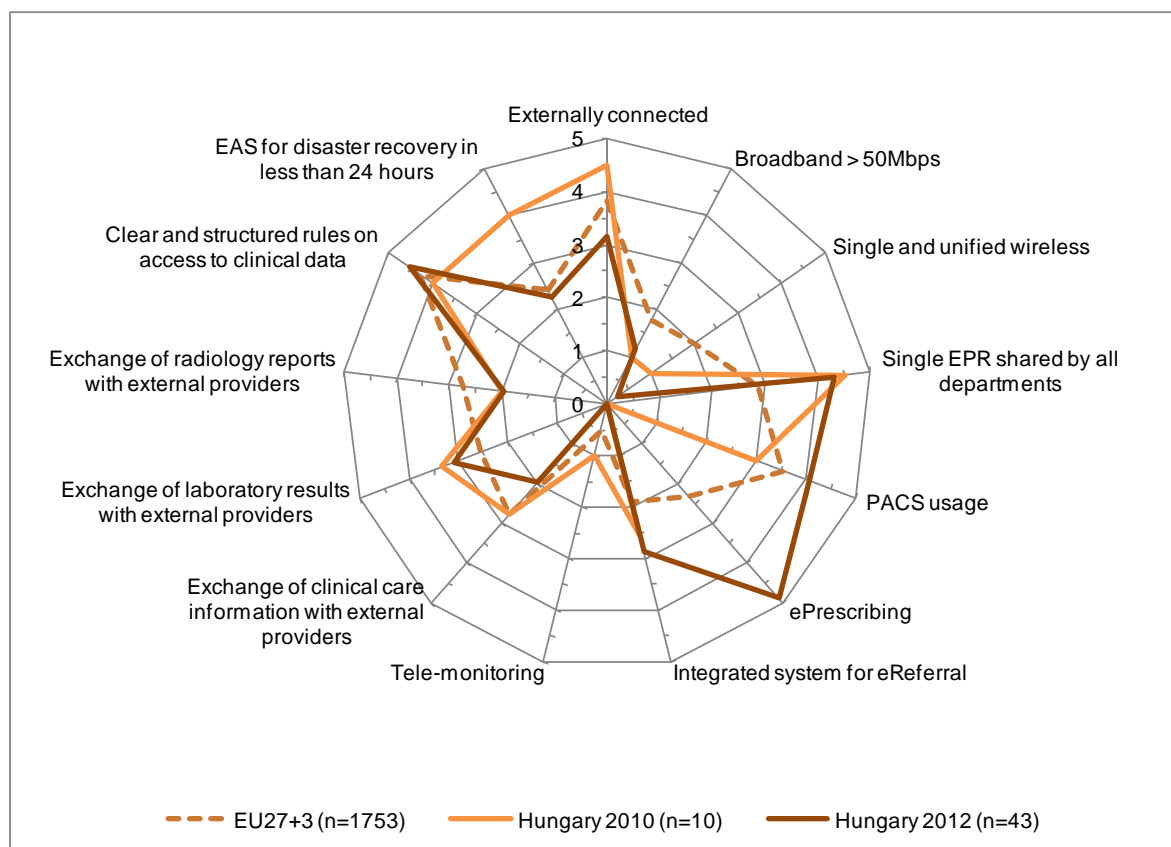
eHealth indicators - Hungary	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-14%	-27%
Broadband > 50Mbps	-12%	3%
Single and unified wireless	-35%	-15%
Single EPR shared by all departments	29%	-4%
PACS usage	11%	21%
ePrescribing	51%	98%
Integrated system for eReferral	19%	7%
Tele-monitoring	-10%	-20%
Exchange of clinical care information with external providers	-16%	-16%
Exchange of laboratory results with external providers	11%	-5%
Exchange of radiology reports with external providers	-16%	0%
Clear and structured rules on access to clinical data	5%	11%
EAS for disaster recovery in less than 24 hours	-3%	-35%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Hungarian eHealth profile in EU27+3

320 Hungary lies close to the European average in terms of its eHealth indicators. The areas with the strongest outperformance in relation to the European average were "*Single EPR shared by all departments*" (29%), "*ePrescribing*" (51%) and *"Integrated system for eReferral"* (19%). Leads in all other areas are relatively marginal

Change in the Hungarian eHealth profile

321 Hungary's eHealth profile has not risen significantly since 2010. Growth has been uneven over the period under review, with "*ePrescribing*" recording a dramatic increase of 98% compared to the previous study. Of the 13 areas, 7 have in fact registered negative growth.
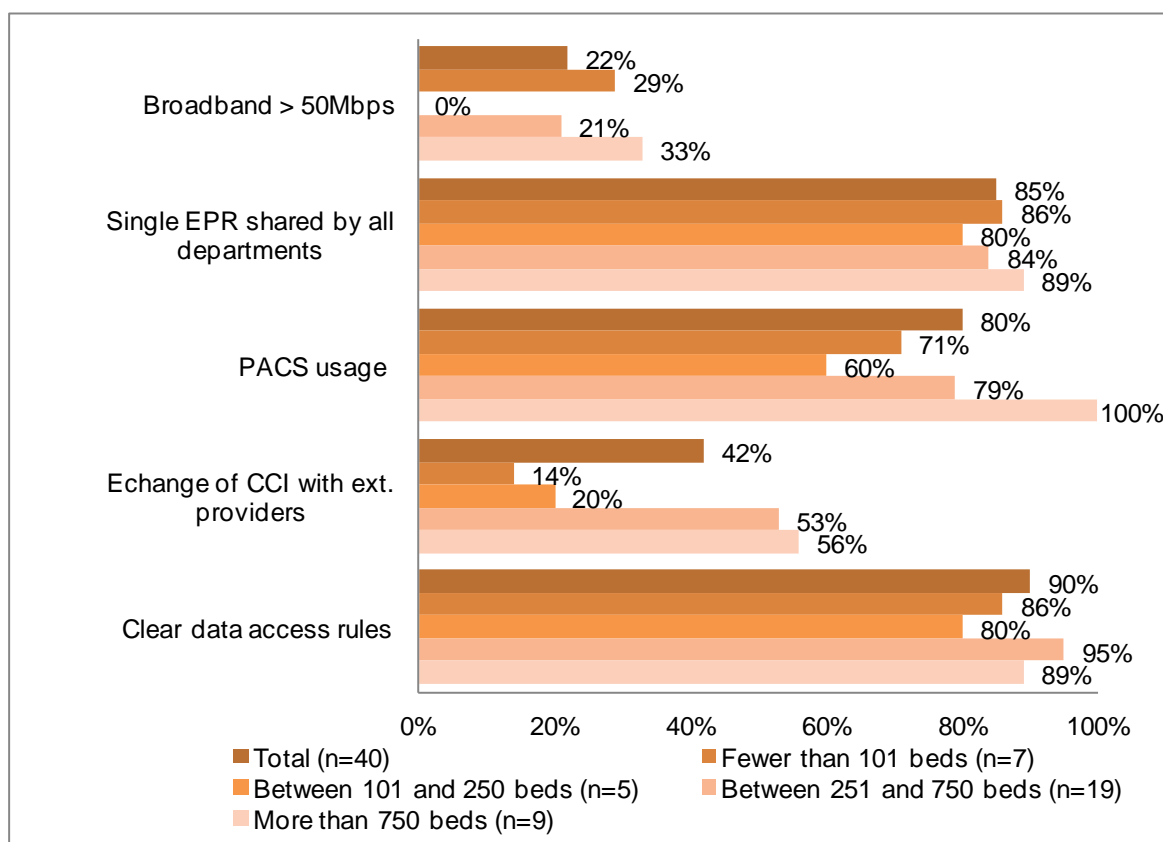
Figure 124: Hungarian acute hospitals eHealth profile by ownership
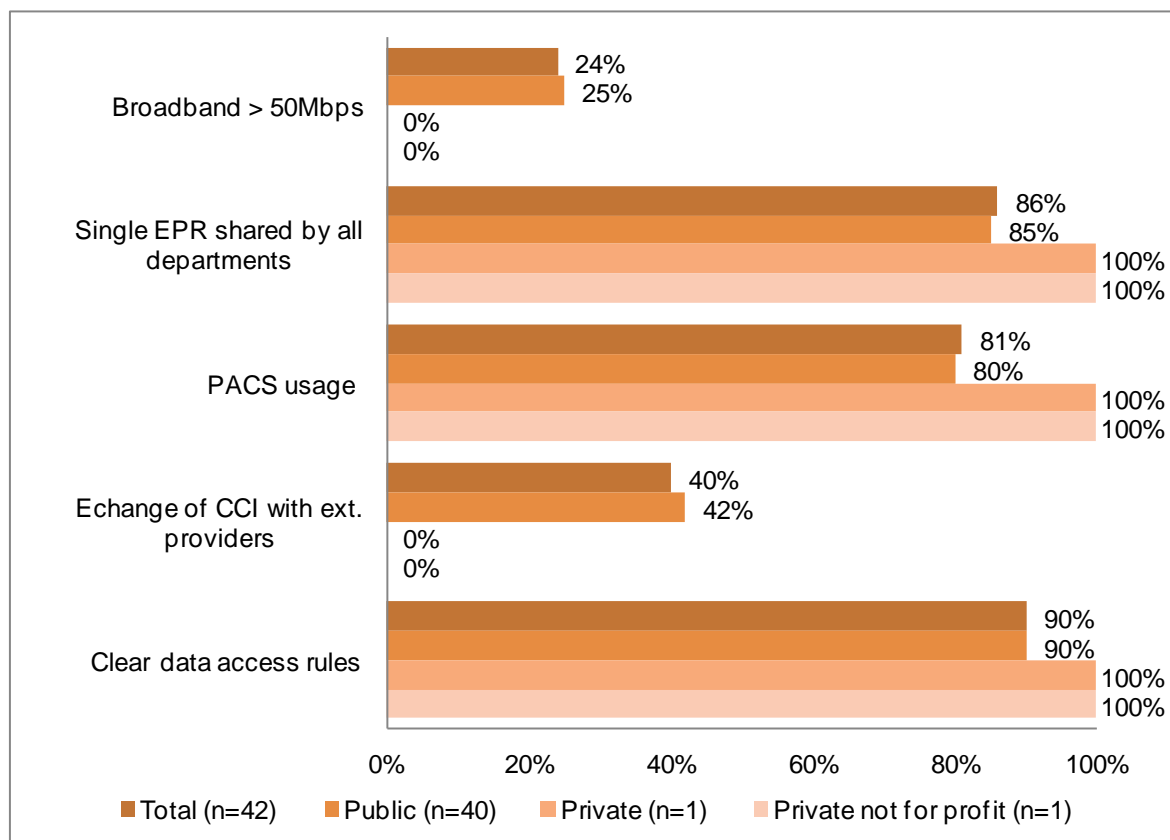
Note: Results are based on valid answers only - category bases may vary from the total reported here.

322 As regards "*Single EPR shared by all departments*", "*PACS usage*" and "*Clear and structured rules on access to clinical data*", Public acute hospital lag behind both Private and Private not for profit hospitals. These latter segments registered 100% values for each of the three areas, although each of these two categories are represented by only one hospital. Despite this, within these areas, Hungarian acute Public hospitals do not lag behind to a dramatic extent, with a maximum gap of 20% for "*PACS usage*". However, there is insufficient data for comparison in other areas.

Figure 125: Hungarian acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.

323   Scale does not appear have a clear influence on the results of eHealth progress in Hungarian acute hospitals. In two areas, "*Single EPR shared by all departments*" and "*Clear and structured rules on access to clinical data*", although larger hospitals tend to be dominate, this lead is not dramatic and overall values are closely grouped with discrepancies of 15 percentage points at most. Of the larger hospitals, those with above 750 beds lead in four of five areas under scrutiny.

5.2.14   Iceland's acute hospital eHealth profile

324   14 hospitals were identified in Iceland. Within this sample, 11 (79%) completed the screener part of the questionnaire and, of these, 71% qualified as acute care hospitals. Of the 10 screened in, 9 acute hospitals (90%) completed the survey.

325   The breakdown by size in Iceland reveals a majority of small hospitals with fewer than 101 beds, while the larger categories counted only one unit each in 2012.

Table 33: Icelandic breakdown by size of hospital

Iceland	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	10	7	1	1	-	1
		70%	10%	10%	-	10%
2012	9	7	1	1	-	-
		78%	11%	11%	-	-
2010	3	2	1	-	-	-
		67%	33%	-	-	-

326   As in 2010, the respondents to the 2012 survey included only public hospitals.

Table 34: Icelandic breakdown by ownership type

Iceland	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	10	9	-	-	1
		90%	-	-	10%
2012	9	9	-	-	-
		100%	-	-	-
2010	3	3	-	-	-
		100%	-	-	-

Figure 126: Icelandic acute hospital eHealth profile
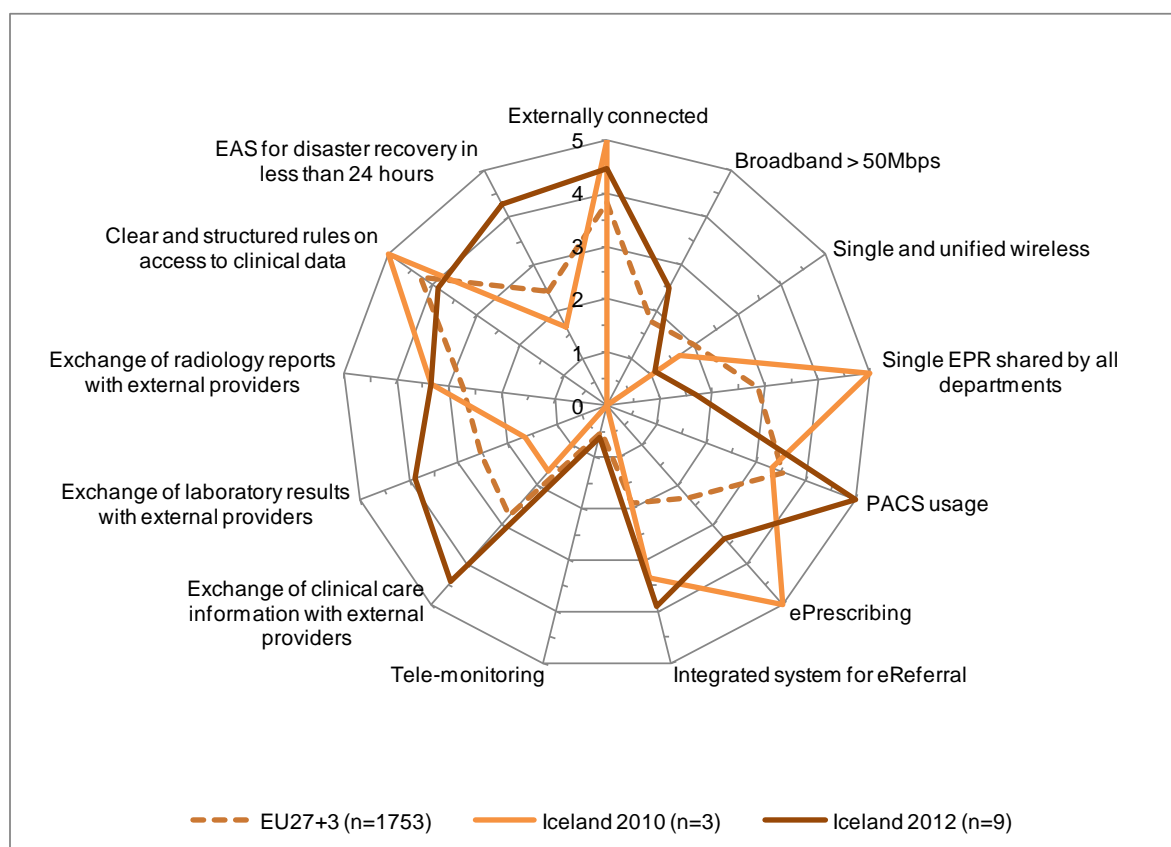
eHealth indicators - Iceland	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	13%	-11%
Broadband > 50Mbps	14%	50%
Single and unified wireless	-18%	-11%
Single EPR shared by all departments	-24%	-67%
PACS usage	29%	33%
ePrescribing	20%	-33%
Integrated system for eReferral	40%	11%
Tele-monitoring	2%	13%
Exchange of clinical care information with external providers	34%	56%
Exchange of laboratory results with external providers	27%	44%
Exchange of radiology reports with external providers	12%	0%
Clear and structured rules on access to clinical data	-8%	-22%
EAS for disaster recovery in less than 24 hours	38%	52%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

327 Iceland comfortably outperforms the European average as regards eHealth. The lead values are also well distributed, with an outperformance of around 12% t0 27% for most indicators. The most successful Icelandic areas of eHealth appear to be "*Integrated system for eReferral*" (40%), "*Exchange of clinical care information with external providers*" (34%) and "*EAS for disaster recovery in less than 24 hours*" (38%). Additionally, only three indicators out of 13 posted a negative value: "*Single and unified wireless*", "*Single EPR shared by all departments*" and "*Clear and structured rules on access to clinical data*" scoring –18%, – 24% and –8% respectively.

Change in the Icelandic eHealth profile

328 Iceland's eHealth profile has grown significantly since 2010. The highest gains were posted in the areas of "*Broadband > 50Mbps*", "*Exchange of clinical care information with external providers*", "*Exchange of laboratory results with external providers*" and "*EAS for disaster recovery in less than 24 hours*", which all grew in excess of 50%. However, "*Single EPR shared by all departments*" dropped by 67% in the same period.

329 As no data was returned for Private and Private not for profit hospitals in Iceland, no comparisons can be made on this basis; however, three areas ("*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*") scored high percentages. These indicators ranged from 78% to 100% in terms of penetration.

Figure 127: Icelandic acute hospitals eHealth profile by ownership
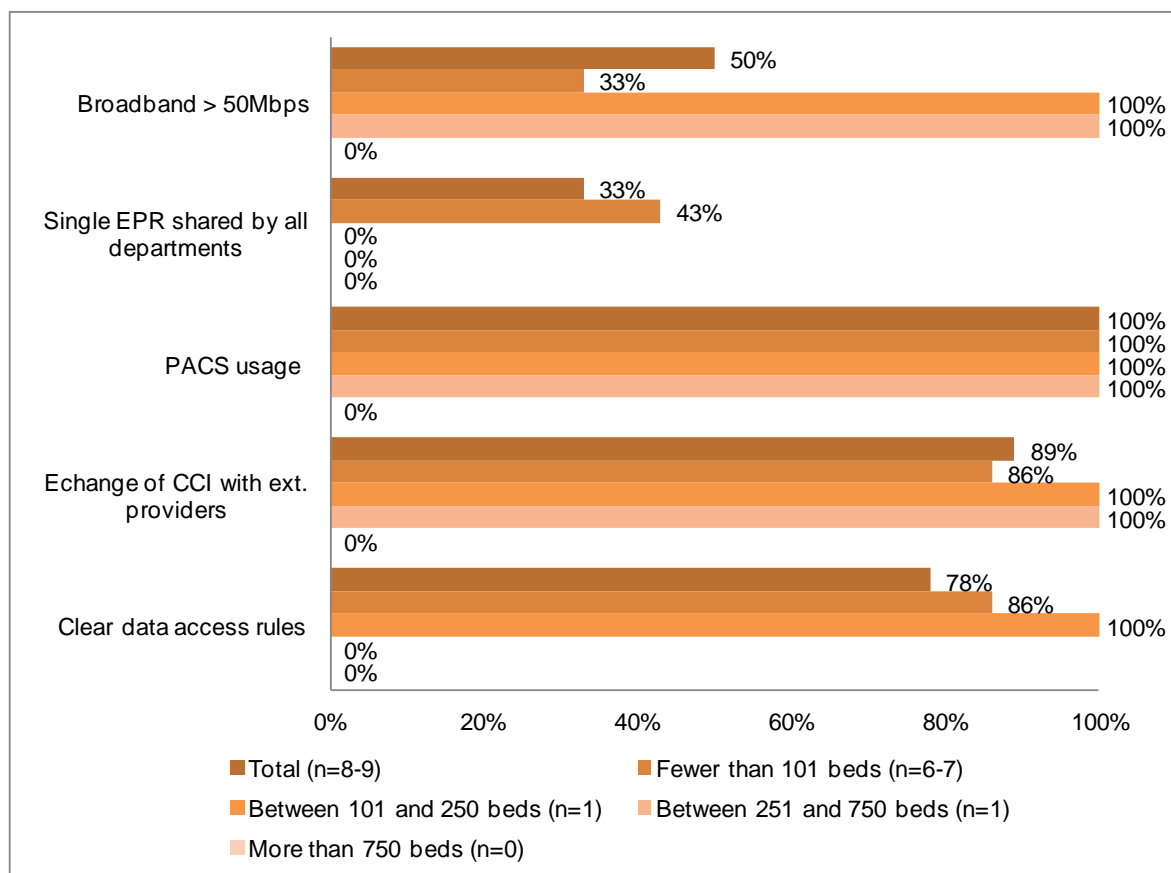
Note: Results are based on valid answers only - category bases may vary from the total reported here.

330 No data was recorded for acute hospitals with more than 750 beds in Iceland, and furthermore, two other indicator categories did not return data for hospitals of any size above 101 beds ("*Single EPR shared by all departments*") and between 251 and 750 beds ("*Clear and structured rules on access to clinical data*"). However, based on the available data, there is a suggestion that the segments of larger hospitals do in fact outperform smaller groups, as medium and large size segments (between 101 and 250 beds as well

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as between 251 and 750 beds) outperform in four of five categories ("*Broadband > 50Mbps*", "*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*").

5.2.15   Ireland's acute hospital eHealth profile

331   492 hospitals were identified in Ireland. Within this sample, 358 (73%) completed the screener part of the questionnaire and, of these, 9% qualified as acute care hospitals. Of the 42 screened in, 23 acute hospitals (55%) completed the survey.

332   Small and intermediate size categories experienced the biggest increase in the number of hospitals between 2010 and 2012.

**Table 35: Irish breakdown by size of hospital**

Ireland	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	42	6	20	13	-	3
		14%	48%	31%	-	7%
2012	23	5	11	7	-	-
		22%	48%	30%	-	-
2010	8	-	1	4	3	-
		-	12%	50%	38%	-

333   While in 2010 respondents for Ireland included only public hospitals, in 2012 the country counted twice as many Public hospitals as in 2010, six Private hospitals and three Private not for profit hospitals.

Table 36: Irish breakdown by ownership type

Ireland	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	42	27	9	3	3
		64%	21%	7%	7%
2012	23	16	6	1	-
		70%	26%	4%	-
2010	8	8	-	-	-
		100%	-	-	-

Figure 128: Irish acute hospital eHealth profile
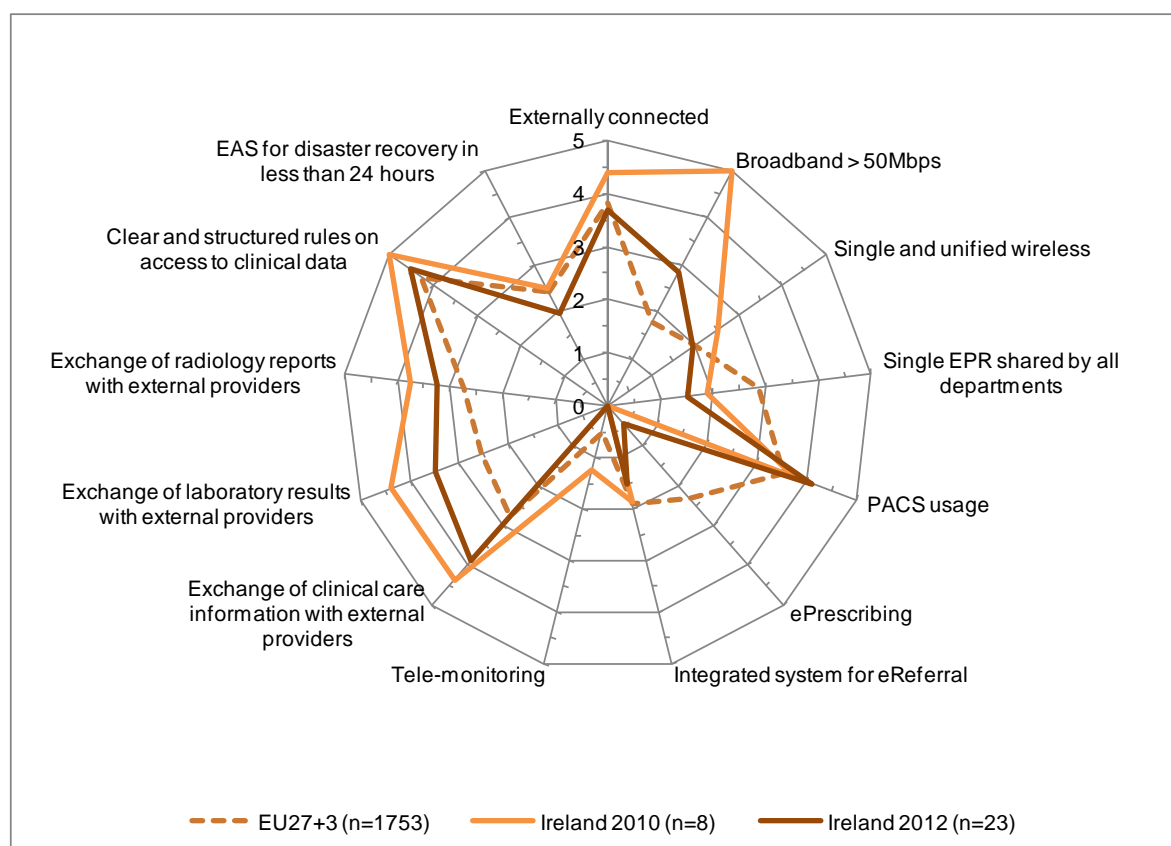
eHealth indicators - Ireland	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-2%	-14%
Broadband > 50Mbps	22%	-43%
Single and unified wireless	-1%	-11%
Single EPR shared by all departments	-27%	-7%
PACS usage	12%	8%
ePrescribing	-38%	9%
Integrated system for eReferral	-7%	-7%
Tele-monitoring	-10%	-25%
Exchange of clinical care information with external providers	23%	-9%
Exchange of laboratory results with external providers	18%	-18%
Exchange of radiology reports with external providers	10%	-10%
Clear and structured rules on access to clinical data	5%	-10%
EAS for disaster recovery in less than 24 hours	-9%	-11%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Irish eHealth profile in EU27+3

334 In 2012 Ireland was largely in line with the European average with respect to eHealth indicators. In addition to this, Ireland is remarkably average in the distribution of its eHealth indicators in relation to the European mean, with disparities ranging from −38% to 23%. However, many of these discrepancies were only marginal.

Change in the Irish eHealth profile

Ireland has made disappointing progress since 2010 as regards its eHealth profile. The largest drops occurred in the areas of "*Broadband > 50Mbps*" and "*Tele-monitoring*", which registered drops of -43% and -25% respectively. Ireland has fallen in 11 of the 13 categories since 2010.
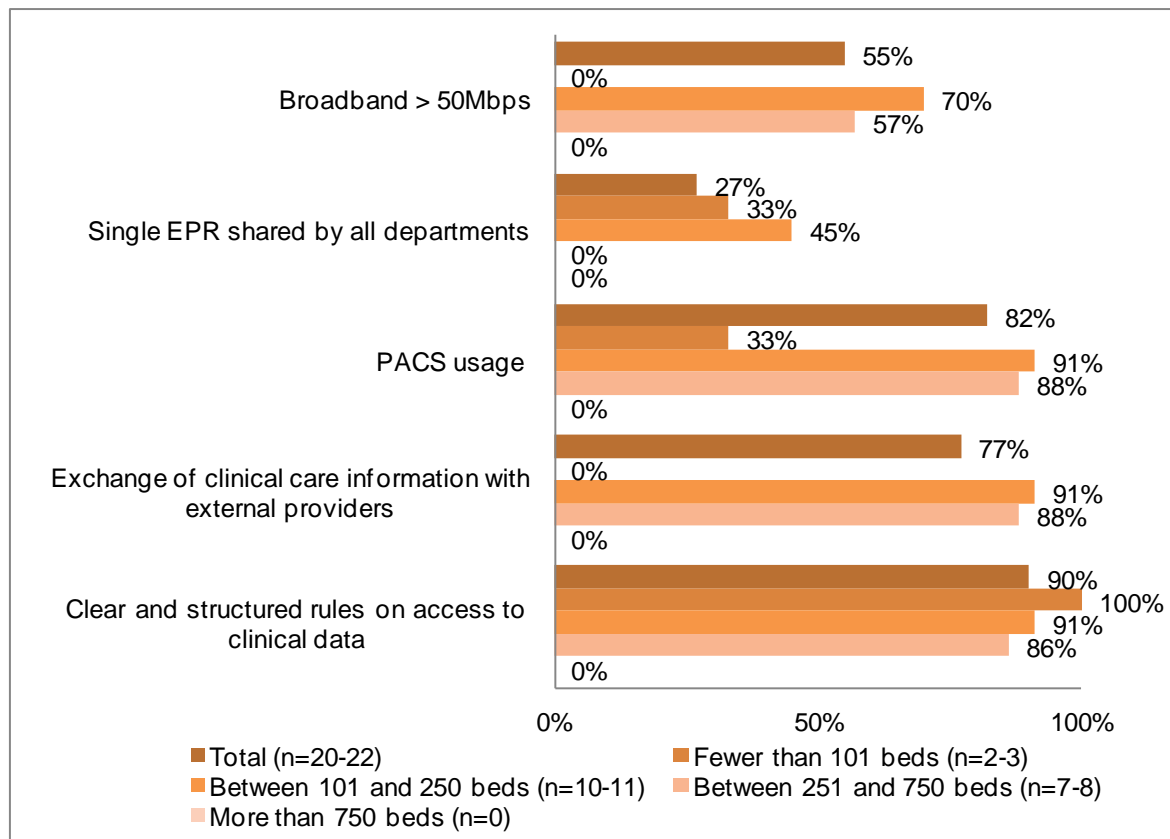
Figure 129: Irish acute hospitals eHealth profile by ownership
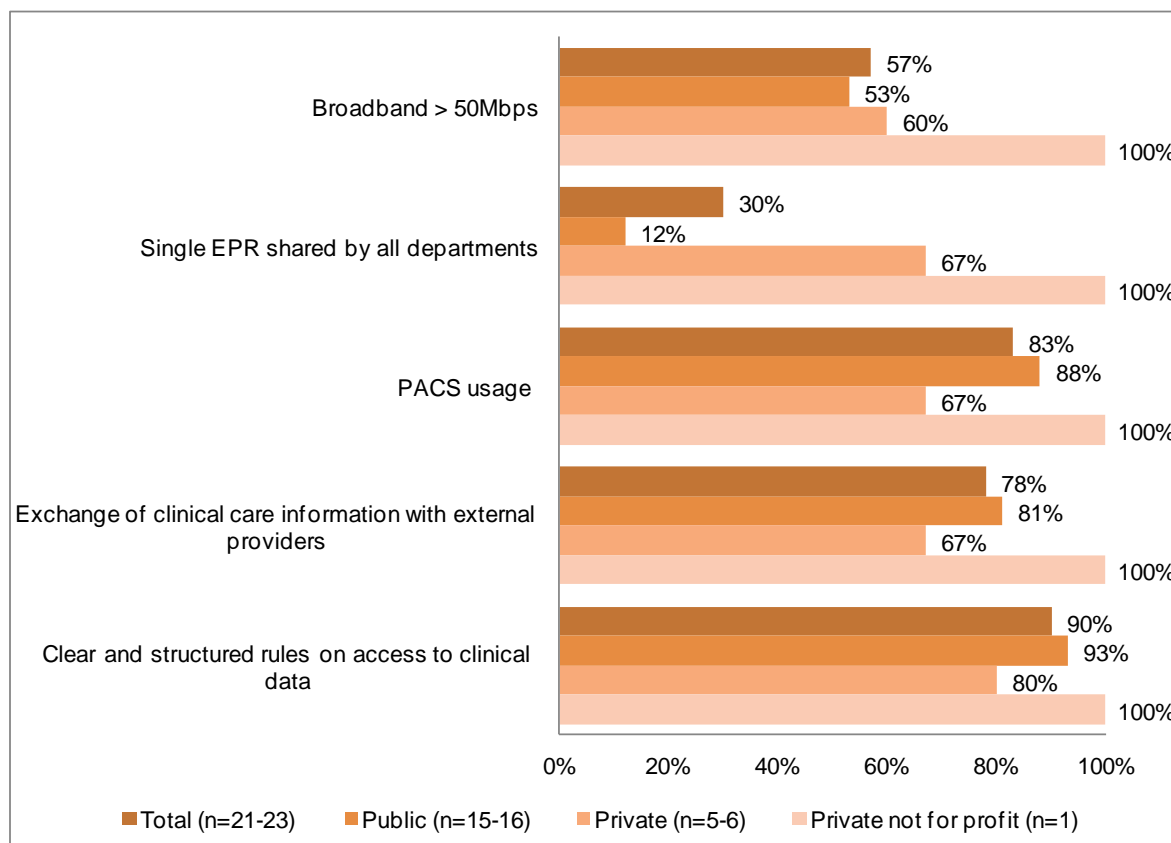
Note: Results are based on valid answers only - category bases may vary from the total reported here.

335 Ireland has an interesting profile when examining leadership in eHealth profiles. The Private not for profit segment (composed of one hospital) leads in all five categories under investigation, with 100% penetration for "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*". This value must be seen with caution as only one Private not for profit hospital participated in the survey. Public hospitals are the next best performers, occupying the second position in three of five areas. Private hospitals occupy the second position in two of five areas. The largest disparity was observed in the area of "*Single EPR shared by all departments*", where Public hospitals are fully 88% behind.

Figure 130: Irish acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.

336 In terms of hospital size, Ireland returned no values for establishments with over 750 beds. The values reported tend to be roughly evenly grouped, although the medium-sized and larger hospital segments (between 101 and 250 beds, and from 251 beds to 750 beds) tend to lead in four of the five areas: "*Broadband > 50Mbps*", "*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*".

5.2.16   Italy's acute hospital eHealth profile

337   2,517 hospitals were identified in Italy. Within this sample, 1063 (42%) completed the screener part of the questionnaire and, of these, 20% qualified as acute care hospitals. Of the 497 screened in, 196 acute hospitals (39%) completed the survey.

338   As regards the breakdown by size, the highest increases in number between 2010 and 2012 were recorded by the biggest categories of hospitals.

**Table 37: Italian breakdown by size of hospital**

Italy	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	497	87	96	143	55	116
		18%	19%	29%	11%	23%
2012	196	39	37	67	21	32
		20%	19%	34%	11%	16%
2010	90	29	26	21	10	4
		32%	29%	23%	11%	4%

339   Public hospitals almost tripled in number between 2010 and 2012, while the number of Private and Private not for profit hospitals declined over the same period.

Table 38: Italian breakdown by ownership type

Italy	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	497	342	106	11	38
		69%	21%	2%	8%
2012	196	136	51	9	-
		69%	26%	5%	-
2010	90	47	29	14	-
		52%	32%	16%	-

Figure 131: Italian acute hospital eHealth profile
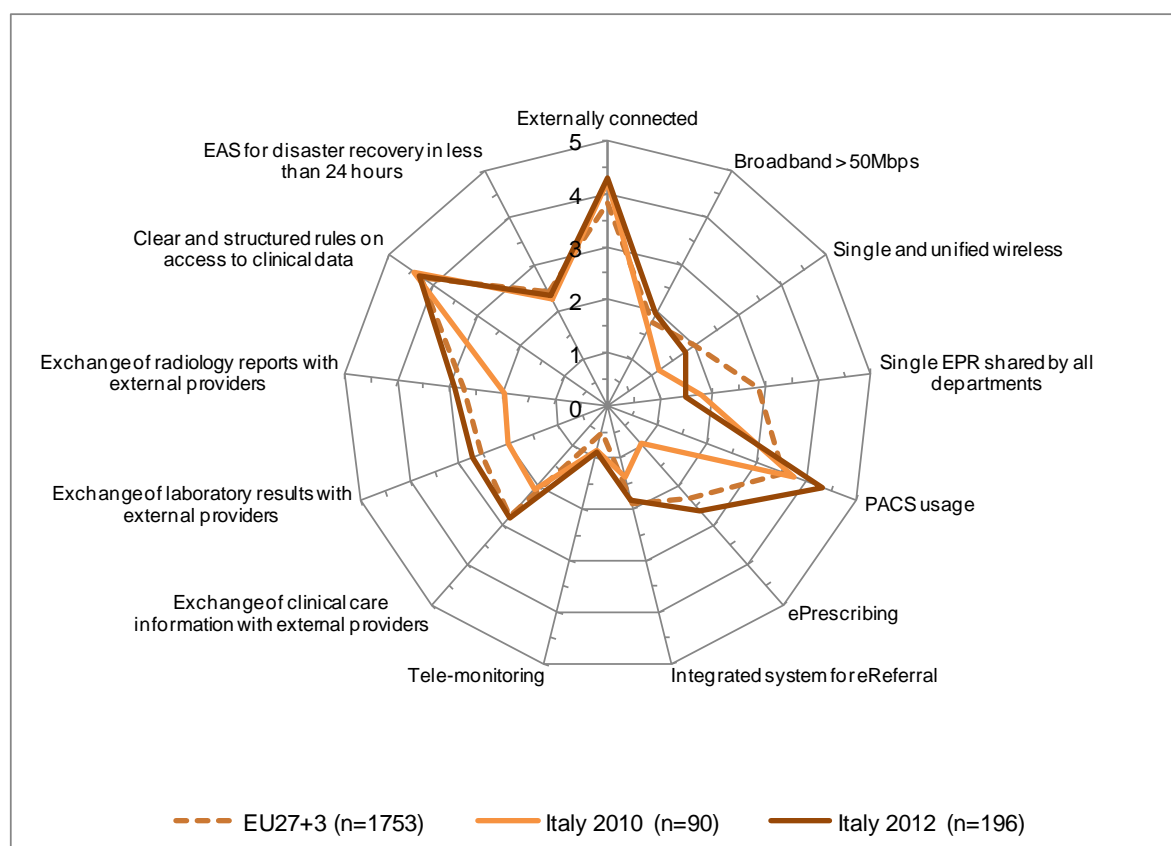
eHealth indicators - Italy	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	9%	1%
Broadband > 50Mbps	3%	6%
Single and unified wireless	-4%	12%
Single EPR shared by all departments	-27%	-6%
PACS usage	15%	11%
ePrescribing	6%	34%
Integrated system for eReferral	-1%	9%
Tele-monitoring	8%	1%
Exchange of clinical care information with external providers	1%	15%
Exchange of laboratory results with external providers	3%	14%
Exchange of radiology reports with external providers	3%	19%
Clear and structured rules on access to clinical data	1%	-2%
EAS for disaster recovery in less than 24 hours	-1%	1%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Italian eHealth profile in EU27+3

340   Italy closely resembles the European average in eHealth. Of 13 areas considered, only one, "*Single EPR shared by all departments*", showed a significant drop (-27%). All other areas track the European average very closely, with only marginal discrepancies.

Change in the Italian eHealth profile

341   Italy's eHealth profile has progressed well from its 2010 position. In addition to this, the distribution has been relatively even, with only one of 13 areas posting a growth level in excess of 10%, being "*ePrescribing*" with a growth of 34%. All other growth areas were marginal, and of all areas examined, only two areas displayed negative growth, which was also marginal.
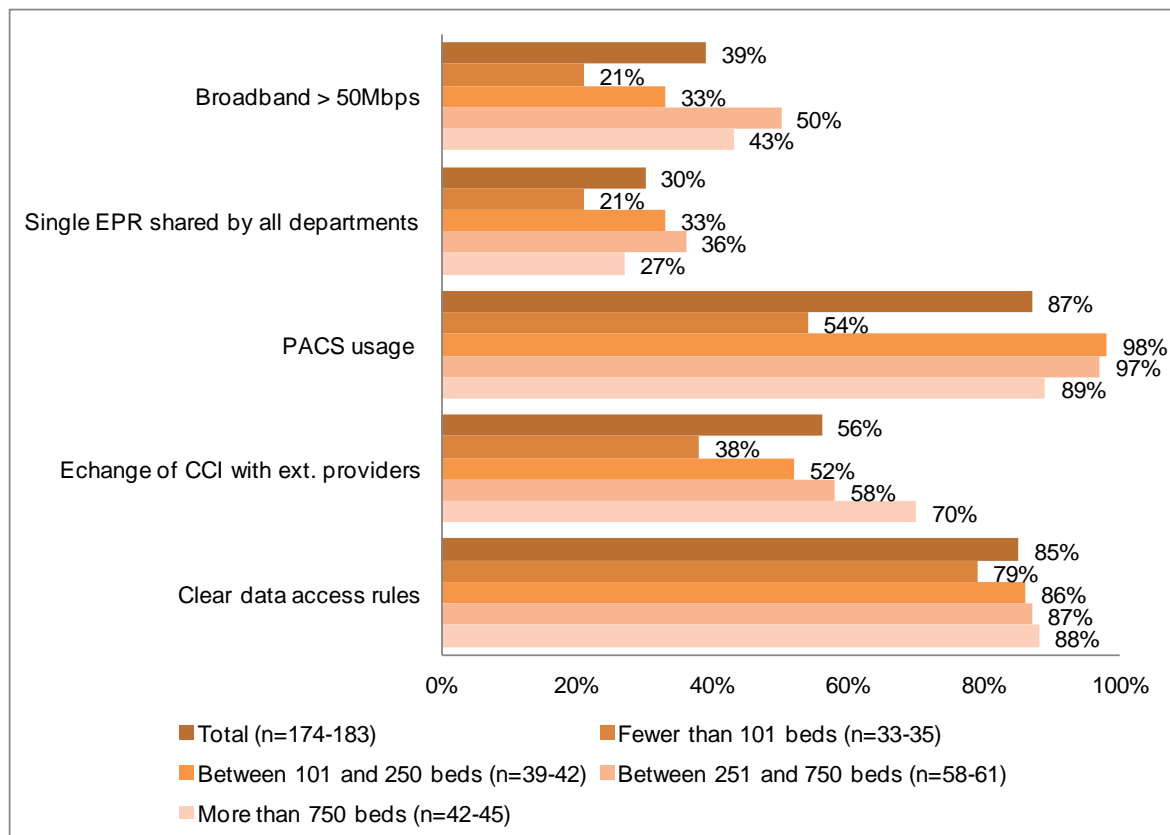
Figure 132: Italian acute hospitals eHealth profile by ownership
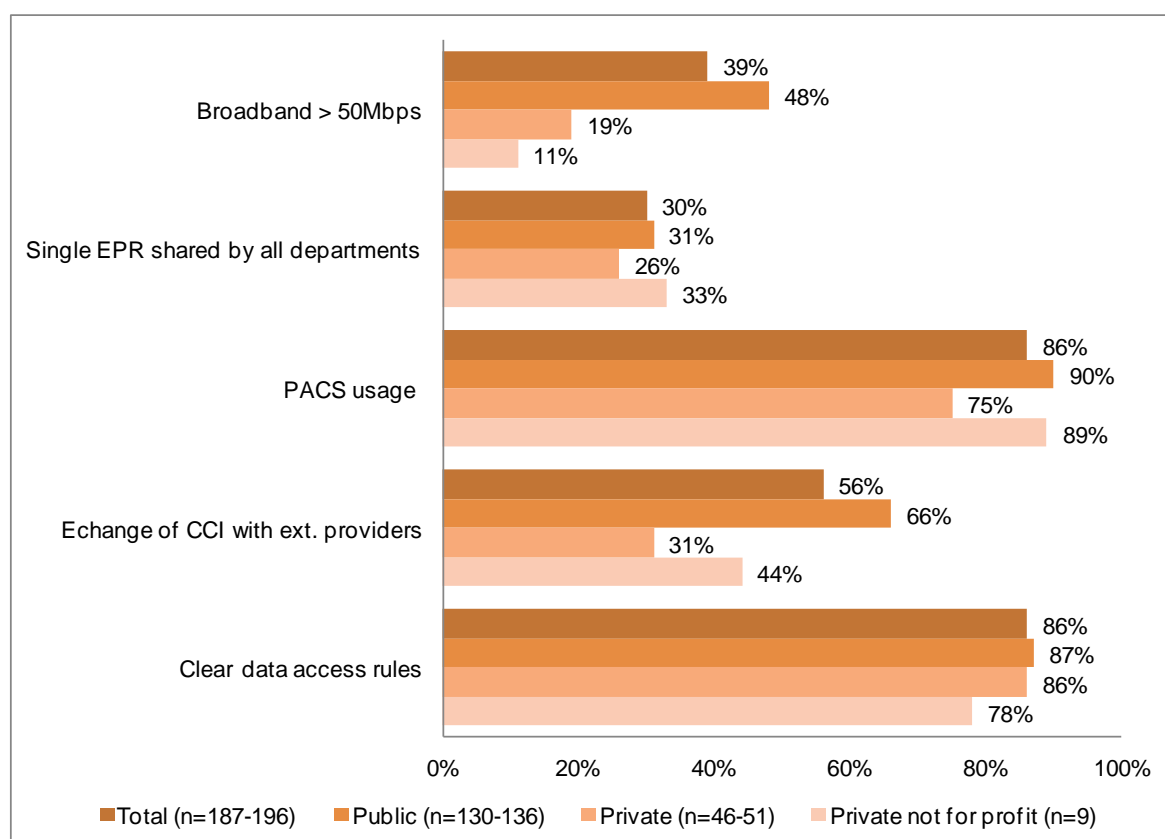
Note: Results are based on valid answers only - category bases may vary from the total reported here.

342   Public acute hospitals in Italy appear to enjoy the best penetration of eHealth capabilities, leading in four of five areas, and with only a 2% lag behind the leader in a fifth area ("*Single EPR shared by all departments*"). The distribution of eHealth capabilities also appears to be roughly similar across Private and Private not for profit acute hospitals, with Private hospitals slightly weaker in terms of percentage penetration (taking last place in three areas of five: "*Single EPR shared by all departments*", "*PACS usage*" and "*Exchange of clinical care information with external providers*").

Figure 133: Italian acute hospitals eHealth profile by size

Note: Results are based on valid answers only - category bases may vary from the total reported here.

343 There appears to be a certain scale effect in Italian hospitals in relation to eHealth endowments, however it is not as clearly pronounced as in other European countries. For example, hospitals with fewer than 101 beds underperform in all five areas considered, however at the larger end of the spectrum hospitals over 750 beds only lead in two of five categories ("*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*"), as do hospitals with between 251 and 750 beds ("*Broadband > 50Mbps*" and "*Single EPR shared by all departments*").

Figure 134: Difference between NUTS 2 level and country-level results

	Broadband > 50Mbps	Single EPR shared by all departments	PACS usage	Exchange of clinical care information with external providers	Clear and structured rules on access to clinical data
Total Italy (n=196)	37%	30%	86%	56%	86%
ITC1 - Piemonte (n=21)	43%	19%	95%	67%	95%
ITC3 - Liguria (n=3)	38%	62%	100%	88%	100%
ITC4 - Lombardia (n=31)	32%	35%	87%	84% **	94%
ITF1 - Abruzzo (n=5)	40%	-	60%	40%	75%
ITF3 - Campania (n=18)	56%	35%	89%	28% *	88%
ITF4 - Puglia (n=11)	45%	27%	64% *	45%	73%
ITF5 - Basilicata (n=4)	25%	75%	100%	75%	75%
ITG1 - Sicilia (n=16)	19%	50%	69%	13% **	87%
ITG2 - Sardegna (n=5)	-	-	80%	75%	100%
ITH1 - Provincia Autonoma di Bolzano/ Bozen (n=3)	67%	-	100%	33%	67%
ITH2 - Provincia Autonoma di Trento (n=2)	-	50%	100%	100%	100%
ITH3 - Veneto (n=16)	44%	38%	100%	56%	87%
ITH4 - Friuli-Venezia Giulia (n=6)	67%	17%	100%	83%	100%
ITH5 - Emilia-Romagna (n=11)	27%	20%	82%	55%	82%
ITI1 - Toscana (n=9)	89% **	22%	78%	78%	89%
ITI3 - Marche (n=9)	22%	-	100%	44%	67%
ITI4 - Lazio (n=14)	21%	17%	86%	50%	85%

Note: Results are based on valid answers only - bases may vary from the total observations reported here
*   Statistically significant difference between the region and the national level at the 95% confidence interval
**   Statistically significant difference between the region and the national level at the 99% confidence interval

344   In the context of the study, we have analysed 17 NUTS 2 regions for Italy. The *ITI1 – Toscana* region scores significantly higher than the national average for *"Broadband > 50Mbps"*, while the *ITC4 – Lombardia*, IT*F3 – Campania, ITG1 – Sicilia* regions have a significantly higher penetration of *"Exchange of clinical care information with external providers"* compared to the national average. *"PACS usage"* in *ITF4 – Puglia* is significantly higher than the Italian average.

345   Overall, two regions, *ITG2 – Sardegna* and *ITH2 – Provincia Autonoma di Trento*, scored the highest, with an average 85% and 88% at combined level. *ITH2 – Provincia Autonoma di Trento* scored 100% in three areas (*"PACS usage"*, *"Exchange of clinical care information with external providers"* and *"Clear and structured rules on access to clinical data"*), but 50% for *"Single EPR shared by all departments"* and zero for *"Broadband > 50Mbps"*. Both the *ITC3 – Liguria* and *ITH4 – Friuli-Venezia Giulia* regions score 100% in *"PACS usage"* and *"Clear and structured rules on access to clinical data"*.

5.2.17 Latvia's acute hospital eHealth profile

346 138 hospitals were identified in Latvia. Within this sample, 95 (69%) completed the screener part of the questionnaire and, of these, 23% qualified as acute care hospitals. Of the 32 screened in, 19 acute hospitals (59%) completed the survey.

347 Intermediate size categories accounted for the largest increases in terms of number hospitals between 2010 and 2012.

Table 39: Latvian breakdown by size of hospital

Latvia	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	32	8	10	8	1	5
		25%	31%	25%	3%	16%
2012	19	5	9	3	1	1
		26%	47%	16%	5%	5%
2010	3	-	2	1	-	-
		-	67%	33%	-	-

348 The number of Public hospitals in Latvia increased from three in 2010 to 16 in 2012. Only one private hospital was counted in 2012.

Table 40: Latvian breakdown by ownership type

Latvia	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	32	23	3	-	6
		72%	9%	-	19%
2012	19	16	1	-	2
		84%	5%	-	11%
2010	3	3	-	-	-
		100%	-	-	-

Figure 135: Latvian acute hospital eHealth profile
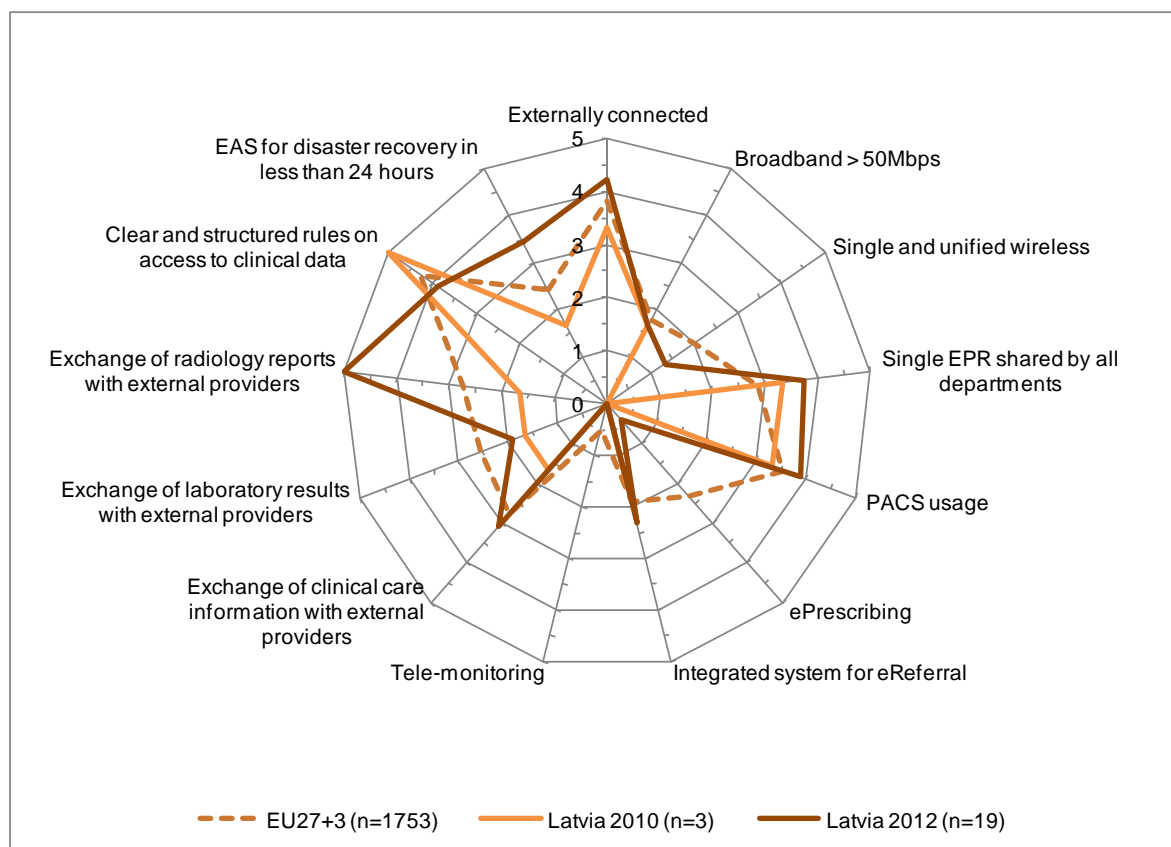
eHealth indicators - Latvia	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	8%	18%
Broadband > 50Mbps	-2%	0%
Single and unified wireless	-14%	26%
Single EPR shared by all departments	18%	8%
PACS usage	7%	11%
ePrescribing	-39%	8%
Integrated system for eReferral	8%	13%
Tele-monitoring	-10%	0%
Exchange of clinical care information with external providers	6%	28%
Exchange of laboratory results with external providers	-13%	5%
Exchange of radiology reports with external providers	45%	67%
Clear and structured rules on access to clinical data	-8%	-22%
EAS for disaster recovery in less than 24 hours	21%	35%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Latvian eHealth profile in EU27+3

349 Latvia experienced an uneven development, with "*Exchange of radiology reports with external providers*" and "*EAS for disaster recovery in less than 24 hours*" outperforming the EU27+3 mean by 45% and 21% respectively, while "*ePrescribing*" was 29% below the European average.

Change in the Latvian eHealth profile

350 Latvia has made great strides in its development of eHealth in acute hospitals. "*Exchange of radiology reports with external providers*" and "*EAS for disaster recovery in less than 24 hours*" accounted for the largest areas of growth at 67% and 35% respectively. Despite this, of the 13 areas examined, only one experienced negative growth and two recorded no variation in relation to the 2010 results.

Figure 136: Latvian acute hospitals eHealth profile by ownership
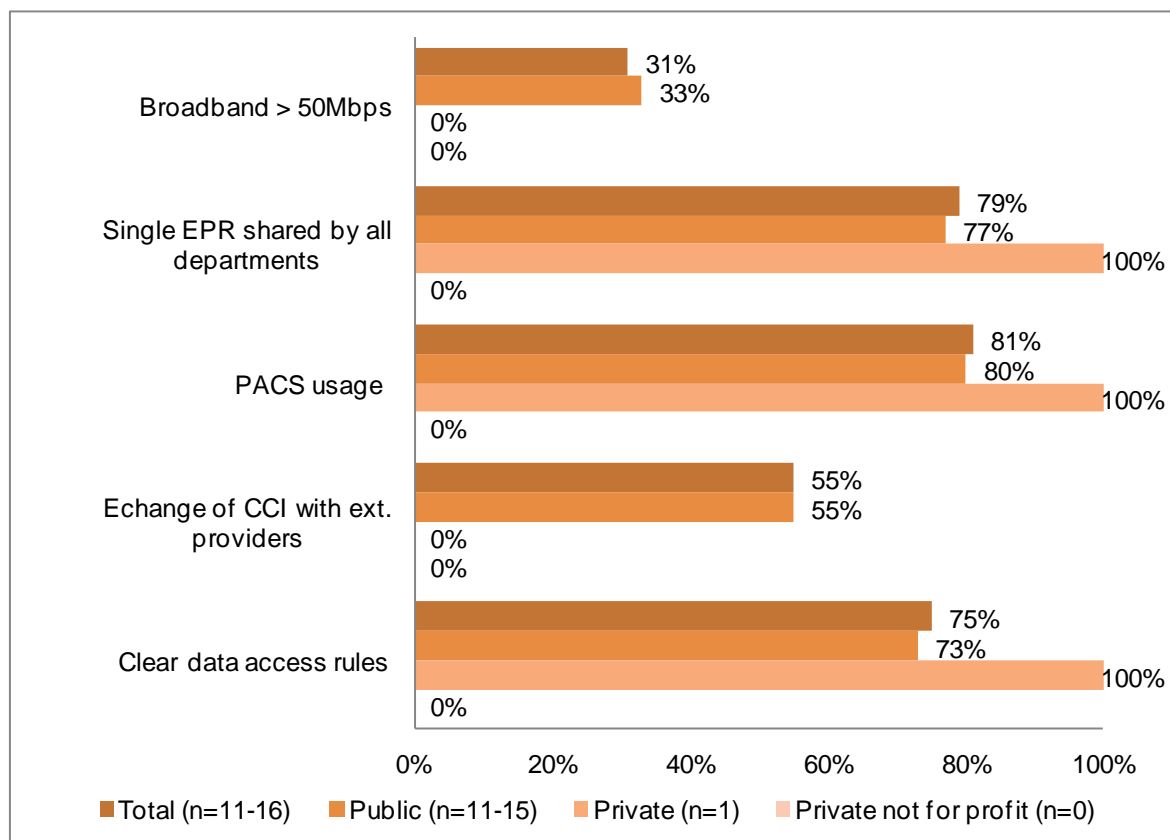
Note: Results are based on valid answers only - category bases may vary from the total reported here.

351 The category of Private not for profit returned no values for Latvia, while values for the sole Private acute hospital were only recorded for three of five areas, in which it recorded full implementation for "*Single EPR shared by all departments*", "*PACS usage*" and "*Clear and structured rules on access to clinical data*". By contrast, Public hospitals clearly lag in these areas, with gaps of 20% or more compared to the Private category.

Figure 137: Latvian acute hospitals eHealth profile by size
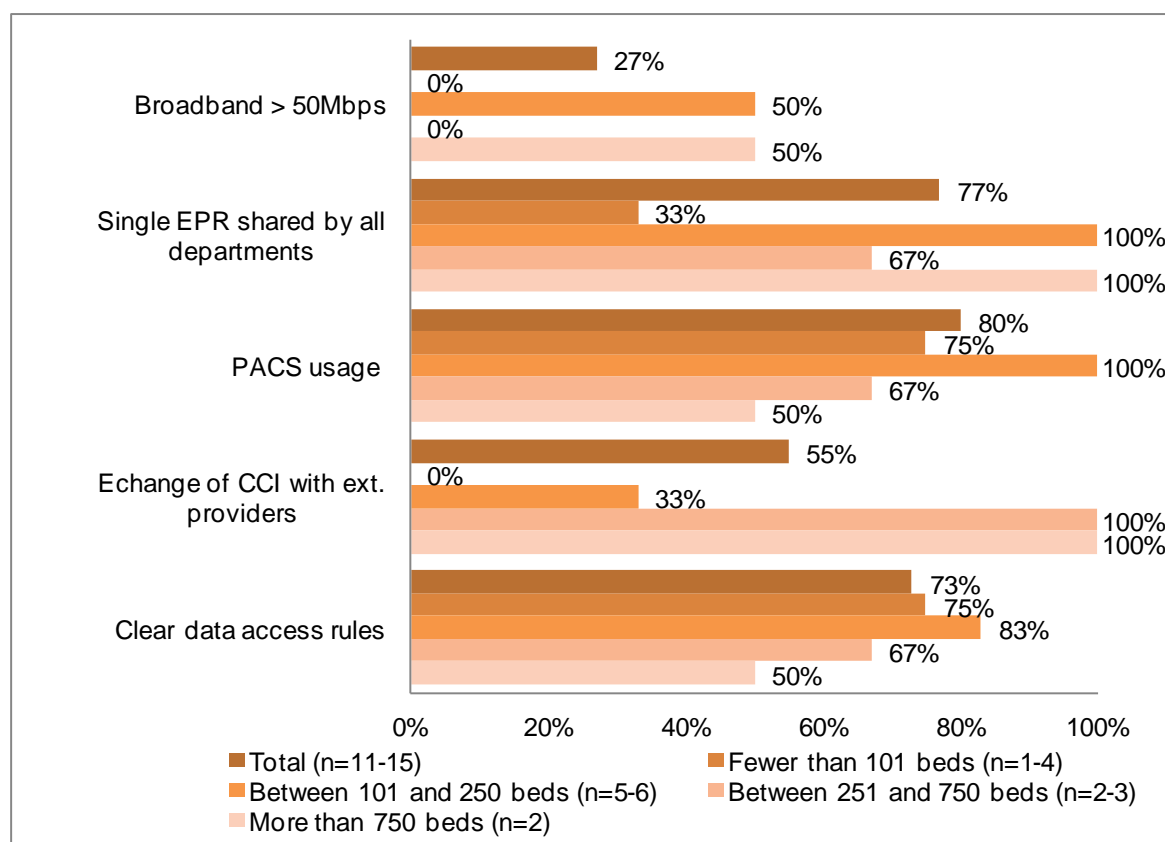
Note: Results are based on valid answers only - category bases may vary from the total reported here.

352   In Latvia, acute hospitals of between 101 and 250 beds in size appear to have the highest penetration of eHealth capabilities, with four of five categories being led (or jointly led) by this segment. In two of these areas ("*Single EPR shared by all departments*" and "*PACS usage*") hospitals with between 101 and 250 beds posted 100% values. Similarly, the largest hospitals with more than 750 beds also recorded full implementation in two areas ("*Single EPR shared by all departments*" and "*Exchange of clinical care information with external providers*"), but large hospitals have underperformed elsewhere, often by a wide margin.

5.2.18 Lithuania's acute hospital eHealth profile

353 219 hospitals were identified in Lithuania. Within this sample, 119 (54%) completed the screener part of the questionnaire and, of these, 29% qualified as acute care hospitals. Of the 63 screened in, 32 acute hospitals (51%) completed the survey.

354 The smallest hospital size categories, namely "fewer than 101 beds" and "between 101 and 250 beds" experienced a substantial increase in terms of number of hospitals between 2010 and 2012.

Table 41: Lithuanian breakdown by size of hospital

Lithuania	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	63	18	17	11	10	7
		29%	27%	17%	16%	11%
2012	32	10	12	5	5	-
		31%	38%	16%	16%	-
2010	10	-	3	4	3	-
		-	30%	40%	30%	-

355 Only Public hospitals were recorded in the breakdown by ownership type, both in 2010 and in 2012.

Table 42: Lithuanian breakdown by ownership type

Lithuania	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	63	57	1	-	5
		90%	2%	-	8%
2012	32	32	-	-	-
		100%	-	-	-
2010	10	10	-	-	-
		100%	-	-	-

Figure 138: Lithuanian acute hospital eHealth profile
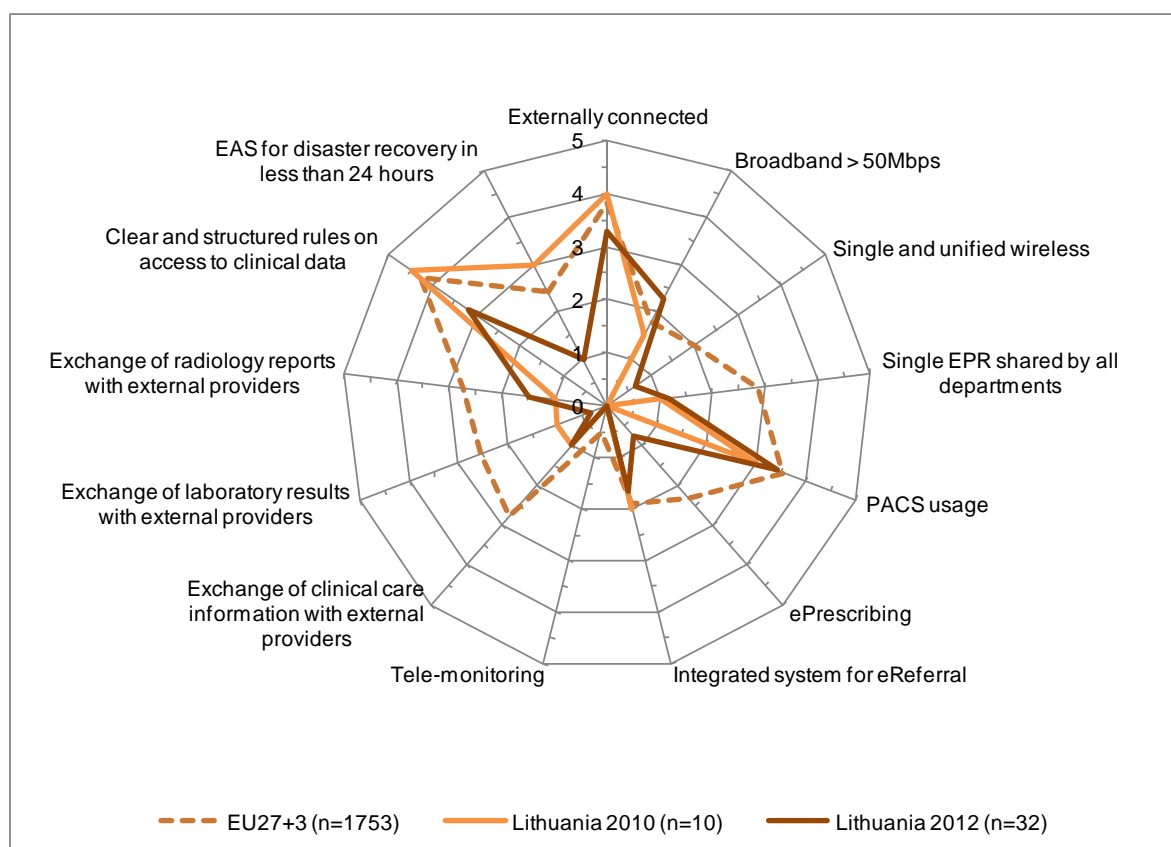
eHealth indicators - Lithuania	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-11%	-14%
Broadband > 50Mbps	10%	15%
Single and unified wireless	-28%	13%
Single EPR shared by all departments	-34%	3%
PACS usage	-2%	9%
ePrescribing	-32%	15%
Integrated system for eReferral	-4%	-7%
Tele-monitoring	-10%	0%
Exchange of clinical care information with external providers	-35%	0%
Exchange of laboratory results with external providers	-45%	-13%
Exchange of radiology reports with external providers	-25%	10%
Clear and structured rules on access to clinical data	-22%	-27%
EAS for disaster recovery in less than 24 hours	-29%	-41%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Lithuanian eHealth profile in EU27+3

356 Lithuania is heavily behind the European average in terms of eHealth, posting negative values in 12 of the 13 examined categories and a positive value of 10% above the average in "*Broadband > 50Mbps*". Based on this, Lithuania can be said to be almost universally underperforming the EU27+3 average. The two largest areas of underperformance were "*Exchange of clinical care information with external providers*" and "*Exchange of laboratory results with external providers*", with –35% and –45% respectively.

Change in the Lithuanian eHealth profile

357 Lithuania has seen a marginal decrease in its overall eHealth profile since 2010. The main contractions were observed in "*Clear and structured rules on access to clinical data*" and "*EAS for disaster recovery in less than 24 hours*", which dropped by 27% and 41% respectively. In all other areas, the decline amounted to less than 15%, with some areas ("*Tele-monitoring*" and "*Exchange of clinical care information with external providers*") recording no variation over the two-year period.

358 No comparison by ownership type can be carried out for Lithuania since only Public hospitals returned data for the survey. Of the values returned by Public hospitals, only two areas scored above 50% in terms of penetration: "PACS usage" and "Clear and structured rules on access to clinical data", at 69% and 63% respectively.

Figure 139: Lithuanian acute hospitals eHealth profile by size
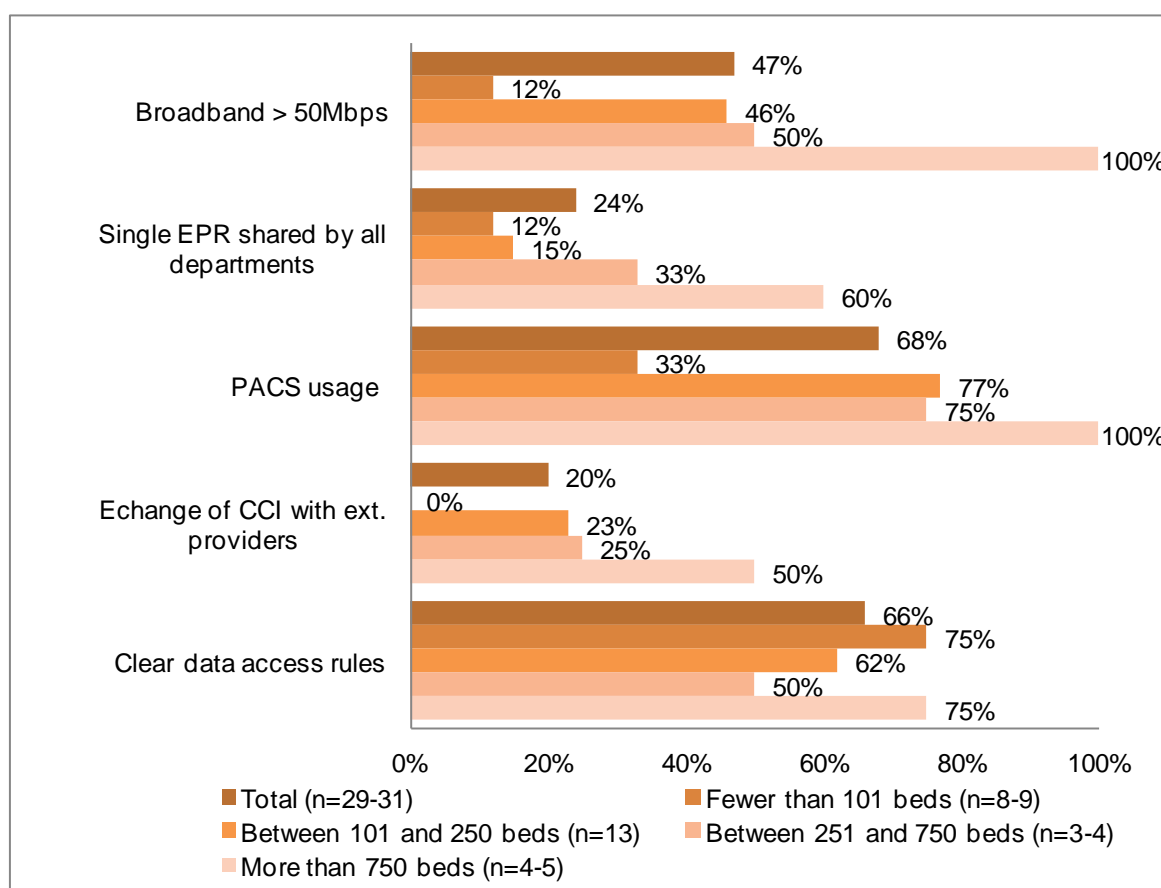
Note: Results are based on valid answers only - category bases may vary from the total reported here.

359 Lithuanian hospitals with more than 750 beds outperformed all other segments in all categories under review, returning 100% values for both "*Broadband > 50Mbps*" and "*PACS usage*". By contrast, acute hospitals with fewer than 101 beds underperformed in three of the five categories, and returned no values for the category of "*Exchange of clinical care information with external providers*". Medium-sized hospitals recorded middling performance, with closely grouped values in three of the five areas.

5.2.19 Luxembourg's acute hospital eHealth profile

360 7 hospitals were identified in Luxembourg. Within this sample, 7 (100%) completed the screener part of the questionnaire and, of these, 100% qualified as acute care hospitals. Of the 7 screened in, 3 acute hospitals (43%) completed the survey.

The breakdown by hospital size has not changed significantly between 2010 and 2012.

Table 43: Luxembourgish breakdown by size of hospital

Luxembourg	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	7	2	-	5	-	-
		29%	-	71%	-	-
2012	3	-	-	3	-	-
		-	-	100%	-	-
2010	3	1	-	2	-	-
		33%	-	67%	-	-

361 The breakdown by ownership type has not changed significantly between 2010 and 2012.

Table 44: Luxembourgish breakdown by ownership type

Luxembourg	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	7	4	-	3	-
		57%	-	43%	-
2012	3	1	-	2	-
		33%	-	67%	-
2010	3	2	1	-	-
		67%	33%	-	-

Figure 140: Luxembourgish acute hospital eHealth profile
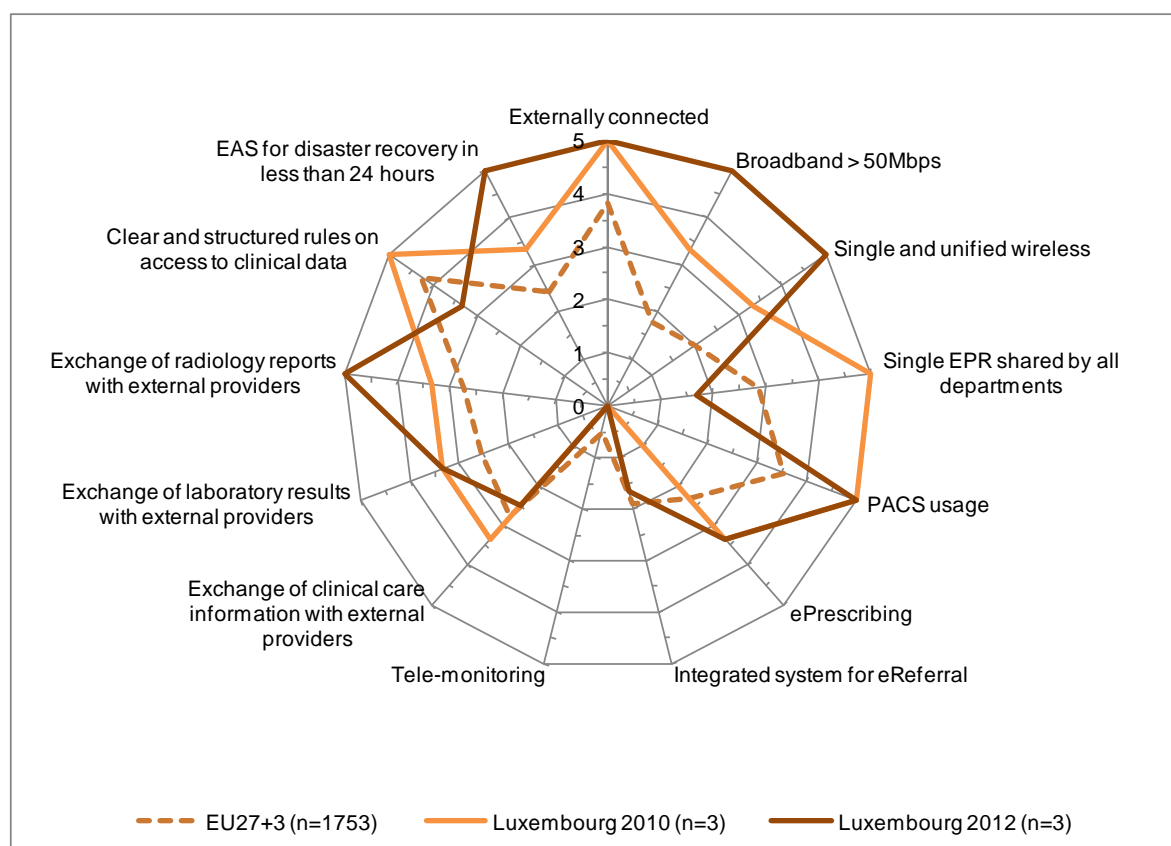
eHealth indicators - Luxembourg	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	24%	0%
Broadband > 50Mbps	64%	33%
Single and unified wireless	60%	33%
Single EPR shared by all departments	-24%	-67%
PACS usage	29%	0%
ePrescribing	20%	0%
Integrated system for eReferral	-4%	33%
Tele-monitoring	-10%	0%
Exchange of clinical care information with external providers	-5%	-17%
Exchange of laboratory results with external providers	15%	0%
Exchange of radiology reports with external providers	45%	33%
Clear and structured rules on access to clinical data	-19%	-33%
EAS for disaster recovery in less than 24 hours	52%	33%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Luxembourgish eHealth profile in EU27+3

362 Luxembourg has an excellent eHealth profile compared to the European average. Values for "*Broadband > 50Mbps*" and "*Single and unified wireless*" were particularly strong, with an average lead of 64% and 60% respectively over the EU27+3 average. "*Exchange of radiology reports with external providers*" and "*EAS for disaster recovery in less than 24 hours*" also scored high, with 45% and 52% respectively.

Change in the Luxembourgish eHealth profile

363 Luxembourg's overall eHealth profile has not changed considerably since 2010. "*Single EPR shared by all departments*" accounted for the most dramatic change, with a drop of 67% in relation to the 2010 position, while "*Broadband >50Mbps*", "*Single and unified wireless*", "*Integrated system for eReferral*", "*Exchange of radiology reports with external providers*" and "*EAS for disaster recovery in less than 24 hours*" all posted gains of 33%.

364 In terms of ownership type, no values were returned for the Private category, meaning that comparisons were possible only between Public hospitals and Private not for profit hospitals. Of these categories, Public hospitals appear to enjoy greater eHealth capabilities than Private not for profit hospitals, with Public hospitals posting 100% values for four of the five categories (with the exception of "*Single EPR shared by all departments*", for which Public hospitals returned no values).

365 No comparisons can be made between hospitals of different sizes in Luxembourg, as only hospitals with between 251 and 750 beds returned any data.

5.2.20 Malta's acute hospitals eHealth profile

366 10 hospitals were identified in Malta. Within this sample, 8 (80%) completed the screener part of the questionnaire and, of these, 30% qualified as acute care hospitals. Of the 3 screened in, 2 acute hospitals (67%) completed the survey.

367 The breakdown by hospital size has not changed significantly between 2010 and 2012.

**Table 45: Maltese breakdown by size of hospital**

Malta	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	3	1	1	-	1	-
		33%	33%	-	33%	-
2012	2	-	1	-	1	-
		-	50%	-	50%	-
2010	3	2	-	-	1	-
		67%	-	-	33%	-

368 The breakdown by ownership type has not changed significantly between 2010 and 2012.

Table 46: Maltese breakdown by ownership type

Malta	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	3	2	1	-	-
		67%	33%	-	-
2012	2	2	-	-	-
		100%	-	-	-
2010	3	2	1	-	-
		67%	33%	-	-

Figure 141: Maltese acute hospital eHealth profile
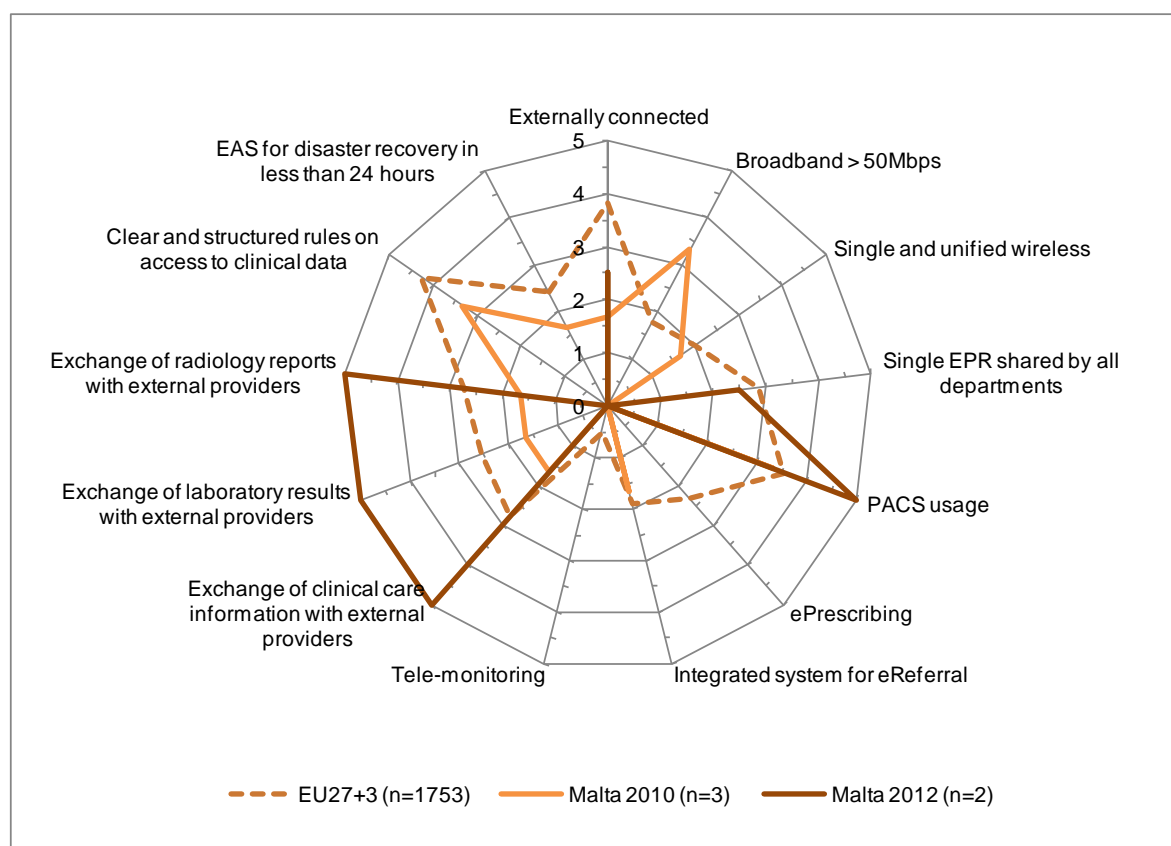
eHealth indicators - Malta	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-26%	17%
Broadband > 50Mbps	-36%	-67%
Single and unified wireless	-40%	-33%
Single EPR shared by all departments	-7%	50%
PACS usage	29%	33%
ePrescribing	-47%	0%
Integrated system for eReferral	-38%	-33%
Tele-monitoring	-10%	0%
Exchange of clinical care information with external providers	45%	67%
Exchange of laboratory results with external providers	49%	67%
Exchange of radiology reports with external providers	45%	67%
Clear and structured rules on access to clinical data	-85%	-67%
EAS for disaster recovery in less than 24 hours	-48%	-33%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Maltese eHealth profile in EU27+3

369   Malta trails the European average in eHealth, with significant discrepancies in four of the 13 areas examined. These are "*Single and unified wireless*" (-40%), "*ePrescribing*" (-47%), "*Clear and structured rules on access to clinical data*" (-85%) and "*EAS for disaster recovery in less than 24 hours*" (-48%). However, for "*Exchange of clinical care information with external providers*", "*Exchange of laboratory results with external providers*" and "*Exchange of radiology reports with external providers*" Malta outperformed the EU27+3 mean by over 45% in each category.

Change in the Maltese eHealth profile

370   Since 2010, Malta has made progress on its eHealth profile. "*Exchange of clinical care information with external providers*", "*Exchange of laboratory results with external providers*" and "*Exchange of radiology reports with external providers*" each recorded gains of 67% between 2010 and 2012.

371   The data returned by Maltese hospitals in terms of ownership type was not sufficient to allow a comparative analysis. Similarly, for Public hospitals, data was not available for two of the five categories under examination, although of the three areas which did return data, Maltese acute hospitals posted 100% penetration for both "PACS usage" and "Exchange of clinical care information with external providers".

372   All Maltese hospitals that could provide data posted 100% penetration for the following eHealth capabilities: "*Single EPR shared by all departments*", "*PACS usage*" and "*Exchange of clinical care information with external providers*". The segments covering fewer than 101 beds and between 101 and 250 beds returned no data.

5.2.21   The Netherlands's acute hospitals eHealth profile

373   606 hospitals were identified in the Netherlands. Within this sample, 381 (63%) completed the screener part of the questionnaire and, of these, 19% qualified as acute care hospitals. Of the 114 screened in, 26 acute hospitals (23%) completed the survey.

374   The breakdown by hospital size has not changed significantly between 2010 and 2012.

Table 47: Dutch breakdown by size of hospital

Netherlands	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	114	7	10	48	15	34
		6%	9%	42%	13%	30%
2012	26	5	3	14	3	1
		19%	12%	54%	12%	4%
2010	29	-	3	19	4	3
		-	10%	66%	14%	10%

375   The breakdown by ownership type has not changed significantly between 2010 and 2012.

Table 48: Dutch breakdown by ownership type

Netherlands	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	114	85	4	6	19
		75%	4%	5%	17%
2012	26	20	1	5	-
		77%	4%	19%	-
2010	29	27	1	-	1
		93%	3%	-	3%

Figure 142: Dutch acute hospital eHealth profile
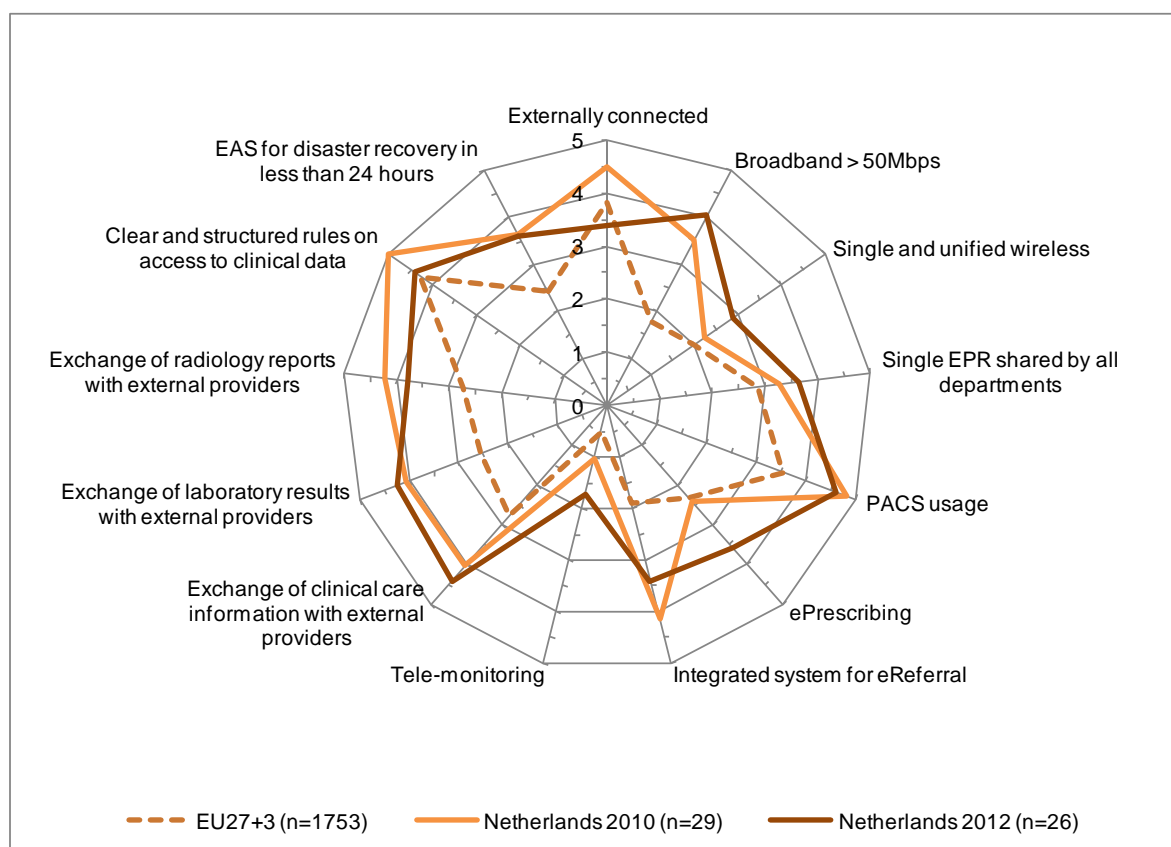
eHealth indicators - Netherlands	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-8%	-22%
Broadband > 50Mbps	45%	10%
Single and unified wireless	18%	13%
Single EPR shared by all departments	16%	8%
PACS usage	21%	-4%
ePrescribing	25%	24%
Integrated system for eReferral	30%	-15%
Tele-monitoring	3%	68%
Exchange of clinical care information with external providers	33%	8%
Exchange of laboratory results with external providers	33%	3%
Exchange of radiology reports with external providers	21%	-9%
Clear and structured rules on access to clinical data	3%	-12%
EAS for disaster recovery in less than 24 hours	21%	8%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Dutch eHealth profile in EU27+3

376 The Netherlands outperforms the European eHealth profile by a wide margin, with *"Broadband > 50Mbps"* 45% in excess of the European average. This high performance is distributed evenly across all sectors, with only one indicator of the 13 under review scoring below the EU27+3 average (*"Externally connected"* at -8%).

Change in the Dutch eHealth profile

377 The Dutch eHealth profile has improved between 2010 and 2012. The single largest gain was realised in the area of *"Tele-monitoring"*, which increased by 68% over the period. By contrast, *"Externally connected"*, *"PACS usage"*, *"Integrated system for eReferral"*, *"Exchange of radiology reports with external providers"* and *"Clear and structured rules on access to clinical data"* all posted negative growth; however, with the exception of *"Externally connected"* these reductions did not exceed 15%.

Figure 143: Dutch acute hospitals eHealth profile by ownership
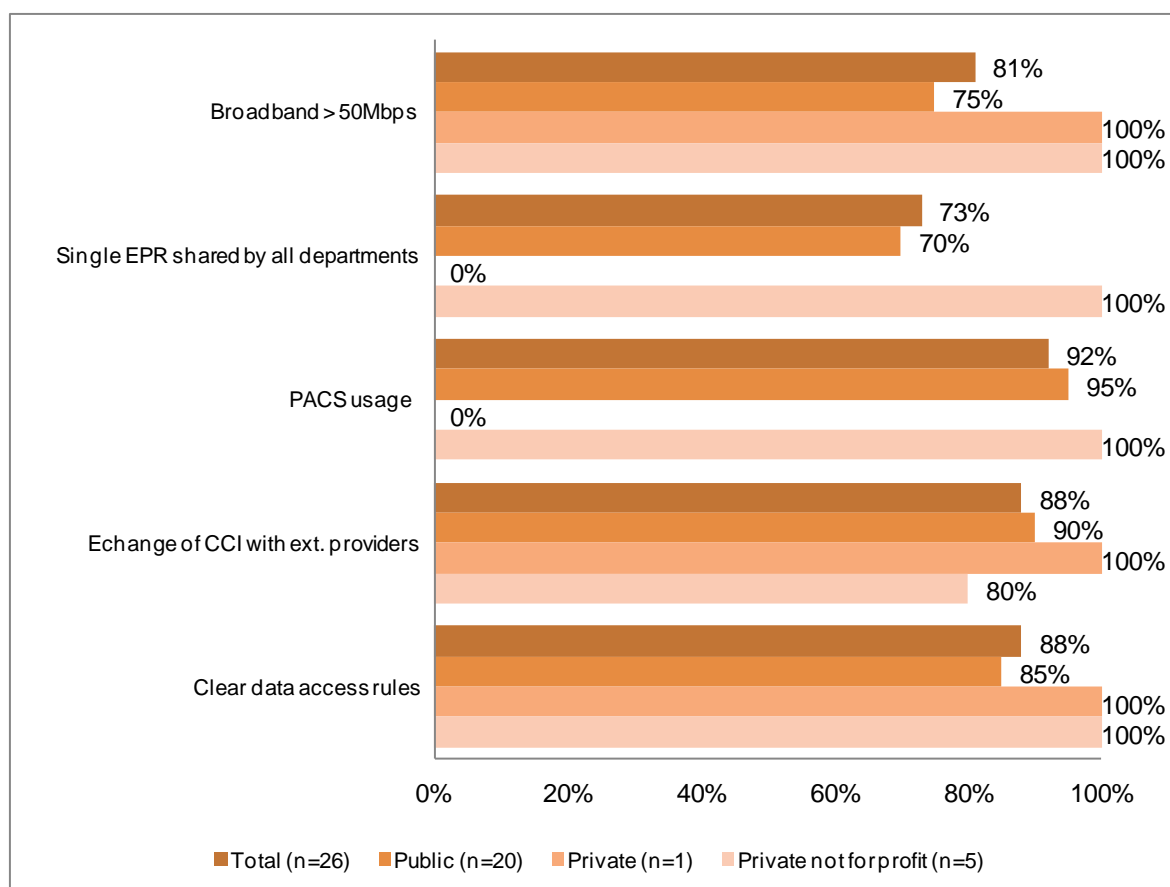
Note: Results are based on valid answers only - category bases may vary from the total reported here.

378 When considering capabilities based on the ownership type of the hospital in question, in the Netherlands we can observe that both Private and Private not for profit hospitals lead in all five categories: *"Broadband > 50Mbps"*, *"Single EPR shared by all departments"*, *"PACS usage"*, *"Exchange of clinical care information with external providers"* and *"Clear and structured rules on access to clinical data"*. Public hospitals, by contrast, lag behind in all these categories, with gaps of up to 30% (*"Single EPR shared by all departments"*).

Figure 144: Dutch acute hospitals eHealth profile by size
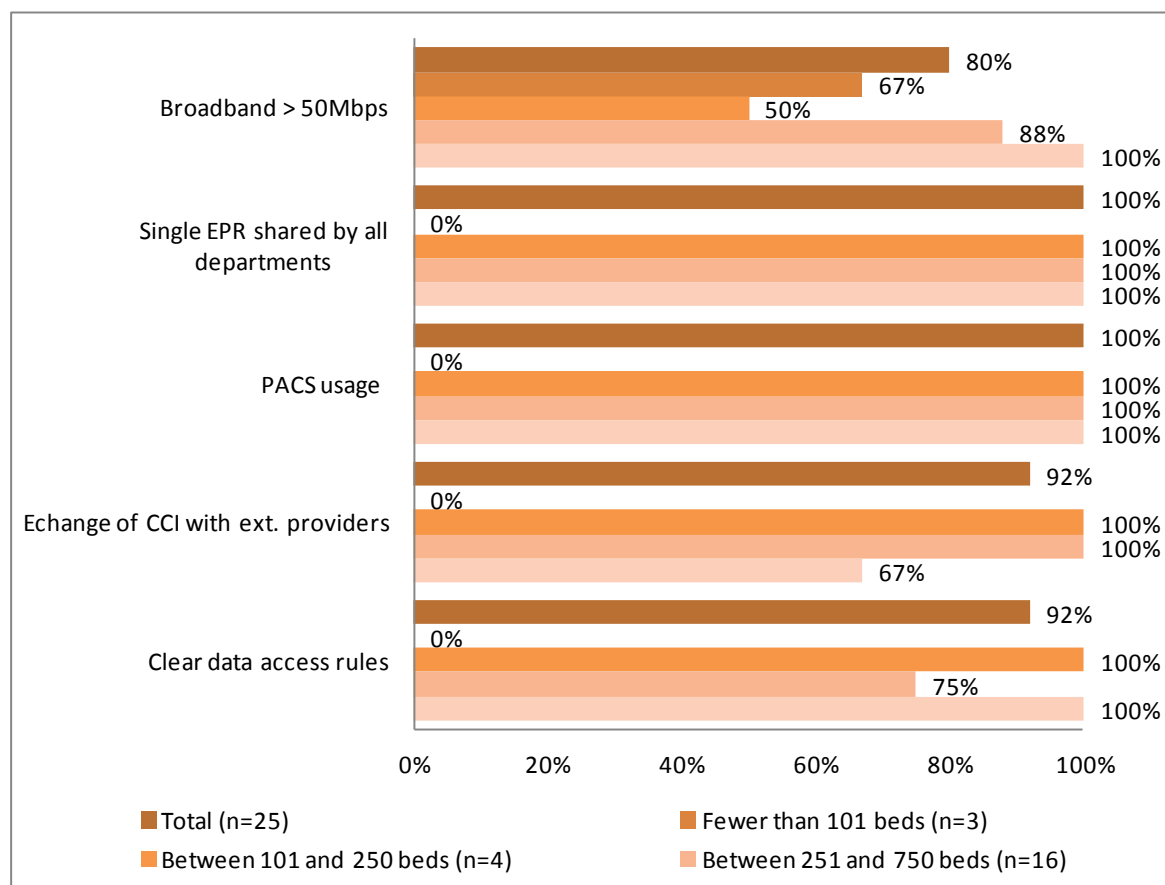
Note: Results are based on valid answers only - category bases may vary from the total reported here.

379   In terms of hospital size, eHealth performance in the Netherlands remains evenly distributed, with very high penetration rates being posted across most segments for "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*PACS usage*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*". However, in most categories, no data was returned for hospitals with fewer than 101 beds.

5.2.22 Norway's acute hospitals eHealth profile

380 100 hospitals were identified in Norway. Within this sample, 75 (75%) completed the screener part of the questionnaire and, of these, 28% qualified as acute care hospitals. Of the 28 screened in, 6 acute hospitals (21%) completed the survey.

381 The breakdown by hospital size has not changed significantly between 2010 and 2012.

Table 49: Norwegian breakdown by size of hospital

Norway	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	28	12	6	4	3	3
		43%	21%	14%	11%	11%
2012	6	2	2	1	1	-
		33%	33%	17%	17%	-
2010	7	1	2	3	1	-
		14%	29%	43%	14%	-

382 The breakdown by ownership type has not changed significantly between 2010 and 2012.

Table 50: Norwegian breakdown by ownership type

Norway	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	28	21	4	1	2
		75%	14%	4%	7%
2012	6	3	3	-	-
		50%	50%	-	-
2010	7	6	-	1	-
		86%	-	14%	-

Figure 145: Norwegian acute hospital eHealth profile
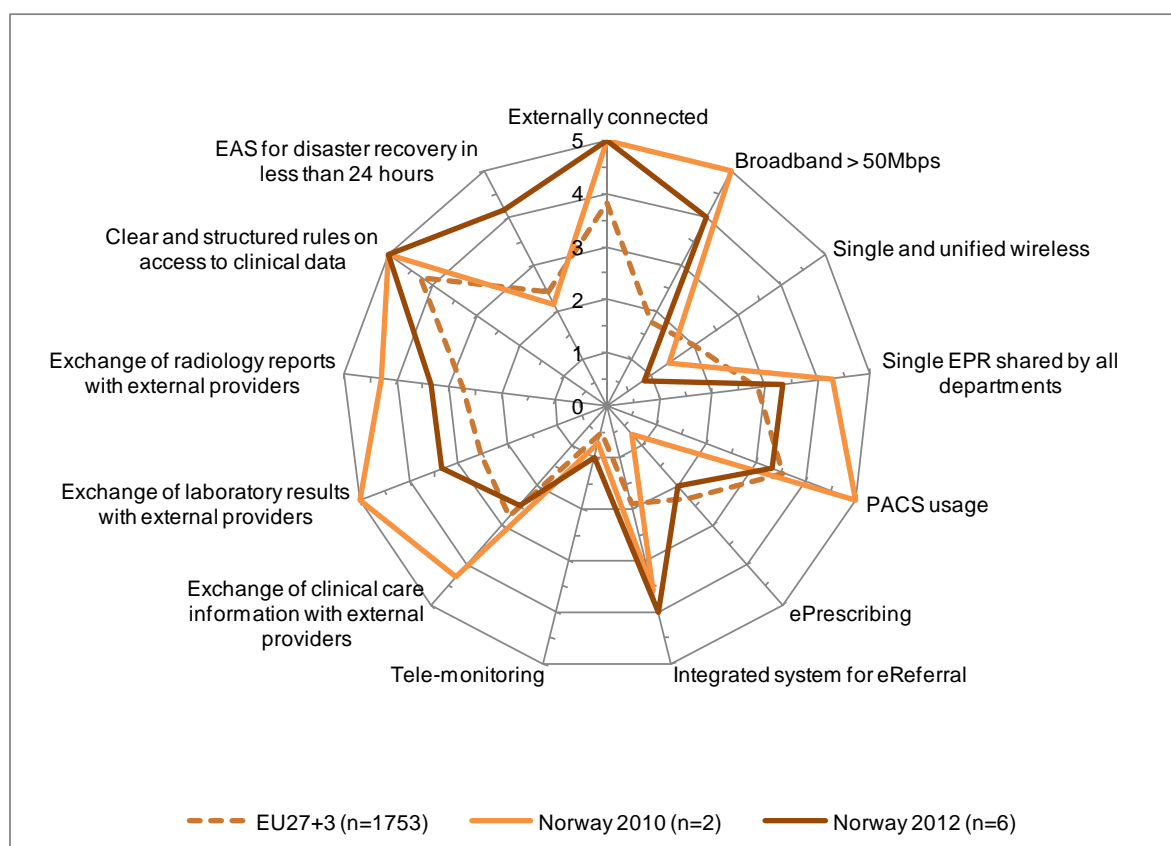
eHealth indicators - Norway	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	24%	0%
Broadband > 50Mbps	44%	-20%
Single and unified wireless	-23%	-12%
Single EPR shared by all departments	10%	-19%
PACS usage	-4%	-33%
ePrescribing	-7%	26%
Integrated system for eReferral	42%	9%
Tele-monitoring	10%	6%
Exchange of clinical care information with external providers	-5%	-36%
Exchange of laboratory results with external providers	15%	-33%
Exchange of radiology reports with external providers	12%	-19%
Clear and structured rules on access to clinical data	15%	0%
EAS for disaster recovery in less than 24 hours	35%	40%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Norwegian eHealth profile in EU27+3

383   Norway is most strongly represented in the areas of "*Broadband > 50Mbps*" and "*Integrated system for eReferral*" for which it is ahead by 44% and 42% respectively. The country is slightly behind in terms of "*Single and unified wireless*" (-23%), "*PACS usage*" (-4%), "*ePrescribing*" (-7%) and "*Exchange of clinical care information with external providers*" (-5%).

Change in the Norwegian eHealth profile

384   Norway's eHealth profile has declined in relation to 2010, with nine of 13 areas posting zero growth or negative growth in 2012. This reduction was fairly evenly distributed, with the largest decreases registered in "*PACS usage*" (-33%), "*Exchange of clinical care information with external providers*" (-36%) and "*Exchange of laboratory results with external providers*" (-33%).

Figure 146: Norwegian acute hospitals eHealth profile by ownership
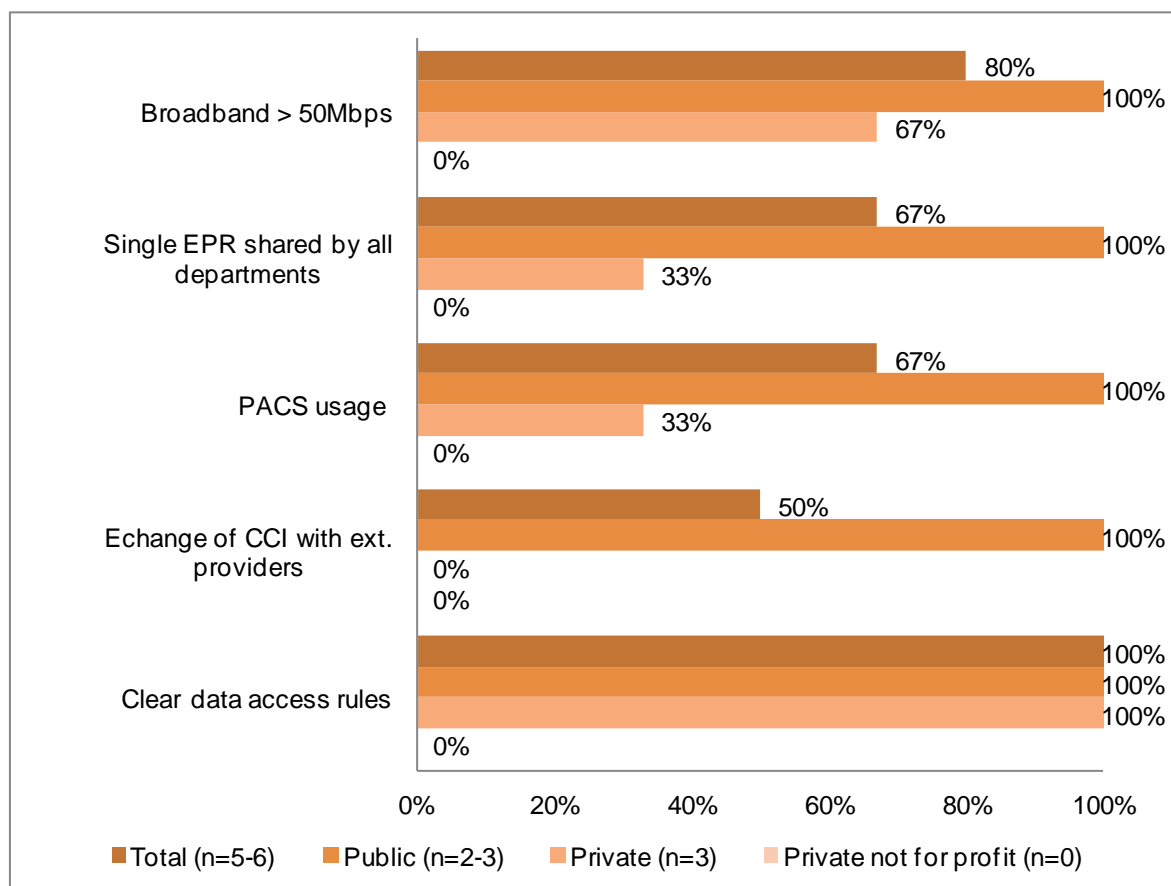
Note: Results are based on valid answers only - category bases may vary from the total reported here.

385   Although Private not for profit hospitals did not return any results for Norway, a clear comparison can still be made between Public and Private hospitals in terms of eHealth capabilities. Public hospitals in Norway recorded full implementation in all five areas under scrutiny and outperformed Private hospitals by a wide margin in the areas of "*Broadband > 50Mbps*", "*Single EPR shared by all departments*" and "*PACS usage*", with differences ranging between 33 and 67 percentage points.

Figure 147: Norwegian acute hospitals eHealth profile by size
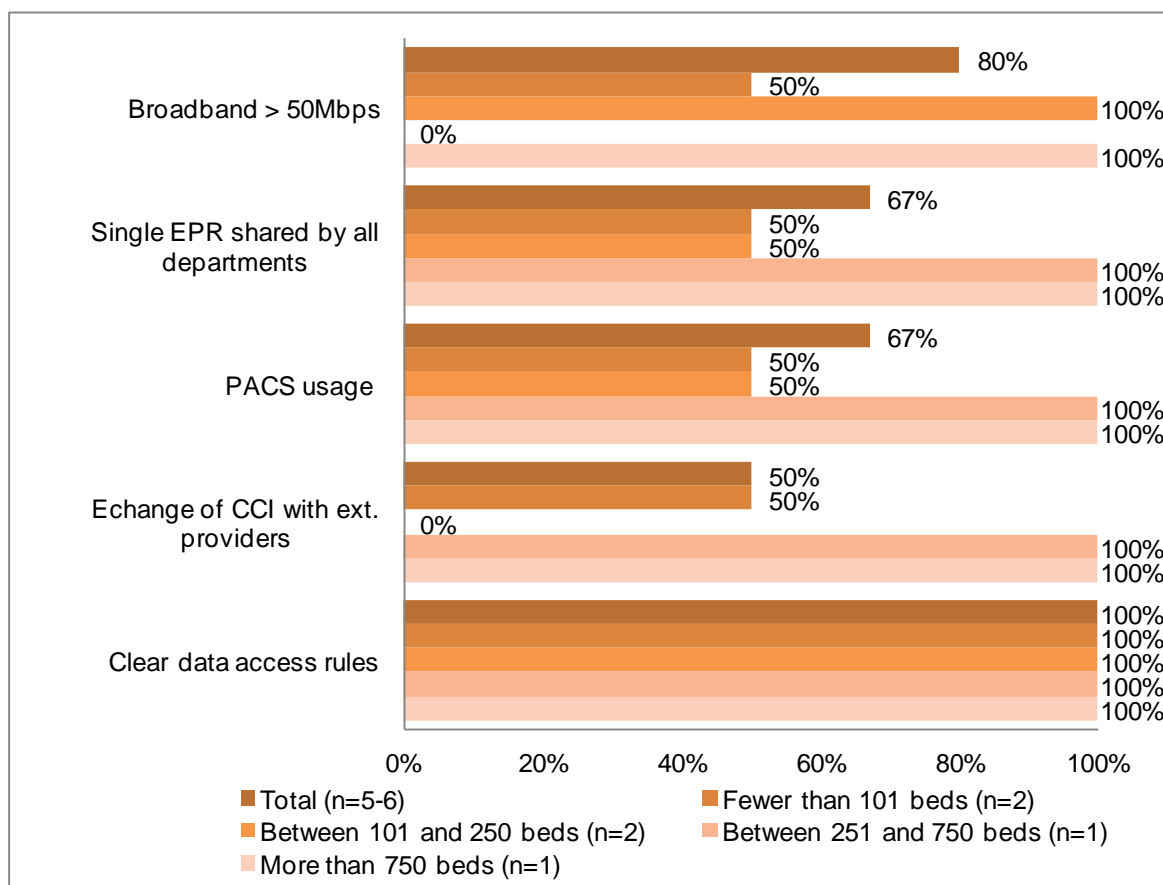
Note: Results are based on valid answers only - category bases may vary from the total reported here.

386 The largest hospitals in Norway by scale (Between 251 and 750 beds and More than 750 beds) appear to enjoy a distinct advantage over the smaller categories of acute hospitals. Larger hospitals led in five of five examined areas, and in four categories enjoyed a 50 percentage point lead over their smaller counterparts. These categories were "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*PACS usage*" and "*Exchange of clinical care information with external providers*".

5.2.23   Poland's acute hospitals eHealth profile

387   2411 hospitals were identified in Poland. Within this sample, 1110 (46%) completed the screener part of the questionnaire and, of these, 19% qualified as acute care hospitals. Of the 459 screened in, 149 acute hospitals (32%) completed the survey.

388   The breakdown by size points to an increase in the number of hospitals between 2010 and 2012, especially in the biggest size categories.

Table 51: Polish breakdown by size of hospital

Poland	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	459	67	157	180	26	29
		15%	34%	39%	6%	6%
2012	149	18	65	54	9	3
		12%	44%	36%	6%	2%
2010	99	21	34	36	3	5
		21%	34%	36%	3%	5%

389   The number of Public and Private hospitals increased significantly between 2010 and 2012.

Table 52: Polish breakdown by ownership type

Poland	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	459	349	69	13	28
		76%	15%	3%	6%
2012	149	118	22	7	2
		79%	15%	5%	1%
2010	99	85	12	-	2
		86%	12%	-	2%

Figure 148: Polish acute hospital eHealth profile
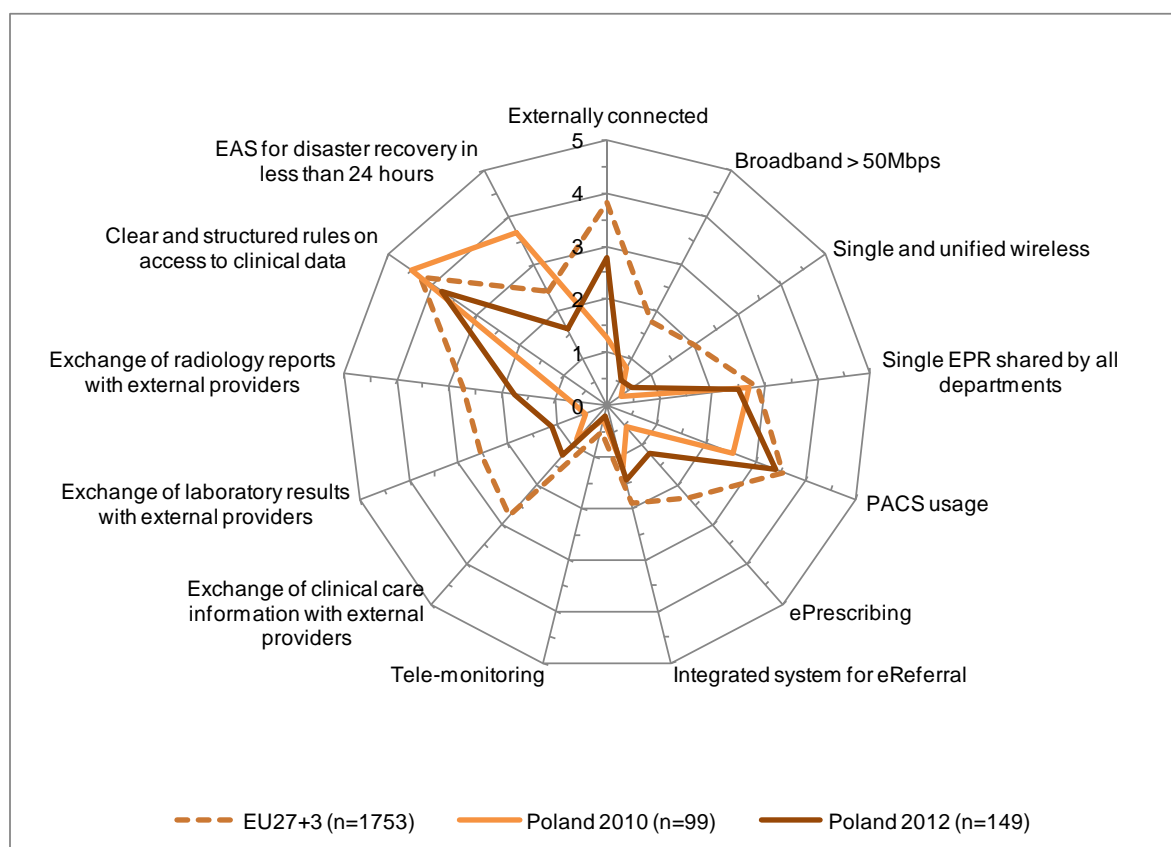
eHealth indicators - Poland	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-21%	30%
Broadband > 50Mbps	-25%	-5%
Single and unified wireless	-28%	6%
Single EPR shared by all departments	-7%	-4%
PACS usage	-3%	18%
ePrescribing	-22%	13%
Integrated system for eReferral	-9%	5%
Tele-monitoring	-6%	-1%
Exchange of clinical care information with external providers	-30%	8%
Exchange of laboratory results with external providers	-29%	14%
Exchange of radiology reports with external providers	-20%	21%
Clear and structured rules on access to clinical data	-9%	-14%
EAS for disaster recovery in less than 24 hours	-16%	-41%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Polish eHealth profile in EU27+3

390   Poland is universally behind the European average in eHealth, with all areas under review behind the corresponding average value. The country's lag was evenly distributed across all 13 sectors and the difference did not exceed 30% in all sectors.

Change in the Polish eHealth profile

391   Despite falling far behind the European average, Poland's eHealth profile has improved somewhat. However, the changes have been broadly spread out across the 13 areas, with the two largest movers ("*Externally connected*" and "*EAS for disaster recovery in less than 24 hours*") posting a 30% and a -41% difference since then.

Figure 149: Polish acute hospitals eHealth profile by ownership type
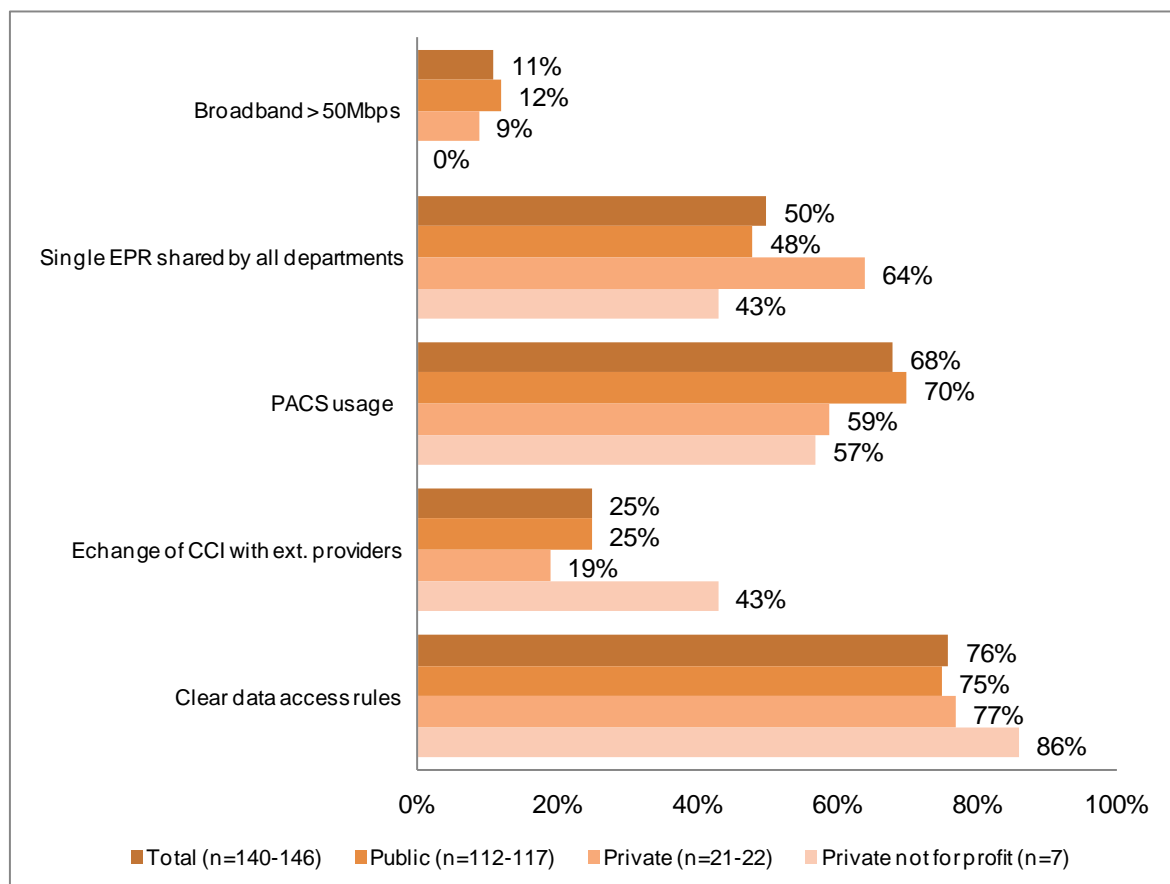
Note: Results are based on valid answers only - category bases may vary from the total reported here.

392   There are no clear discrepancies in terms of eHealth capabilities in Polish acute hospitals when ownership characteristics are taken into account. Private not for profit acute hospitals score highly in two specific areas ("*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*"), but either underperformed or did not return values for the other areas under review. Public hospitals, by contrast, led in only two areas ("*PACS usage*" and "*Broadband > 50Mbps*"), although this advantage was only marginal.

Figure 150: Polish acute hospitals eHealth profile by size
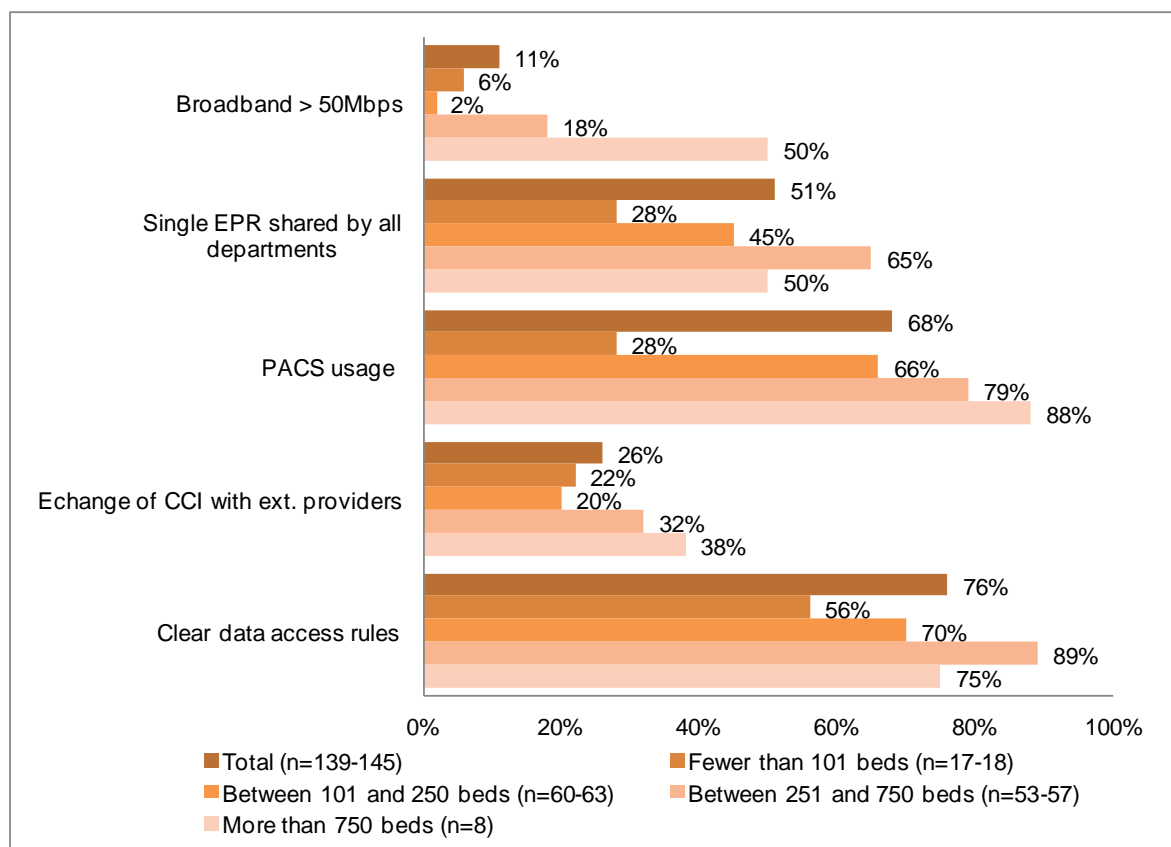
Note: Results are based on valid answers only - category bases may vary from the total reported here.

393   The scale of Polish acute hospitals does appear to be a significant factor in the development of eHealth capabilities, both in terms of leadership and extent of leadership. In all five categories examined, hospitals with between 251 and 750 beds and with more than 750 beds outperformed hospitals of lesser scale. In addition, this advantage was often significant, as can be seen in "*Broadband > 50Mbps*", "*Single EPR shared by all departments*" and "*PACS usage*" where differences amounted to 48, 37 and 60 percentage points respectively.

5.2.24 Portugal's acute hospitals eHealth profile

394 589 hospitals were identified in Portugal. Within this sample, 224 (38%) completed the screener part of the questionnaire and, of these, 12% qualified as acute care hospitals. Of the 73 screened in, 41 acute hospitals (56%) completed the survey.

395 Smaller size categories experienced the highest increase in terms of number of hospitals between 2010 and 2012.

Table 53: Portuguese breakdown by size of hospital

Portugal	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	73	21	16	7	3	26
		29%	22%	10%	4%	36%
2012	41	13	11	6	3	8
		32%	27%	15%	7%	20%
2010	20	7	5	7	1	-
		35%	25%	35%	5%	-

396 Both Private and Public hospitals experienced a significant increase in terms of number of hospitals between 2010 and 2012.

Table 54: Portuguese breakdown by ownership type

Portugal	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	73	34	20	8	11
		47%	27%	11%	15%
2012	41	24	13	4	-
		59%	32%	10%	-
2010	20	13	2	5	-
		65%	10%	25%	-

Figure 151: Portuguese acute hospital eHealth profile
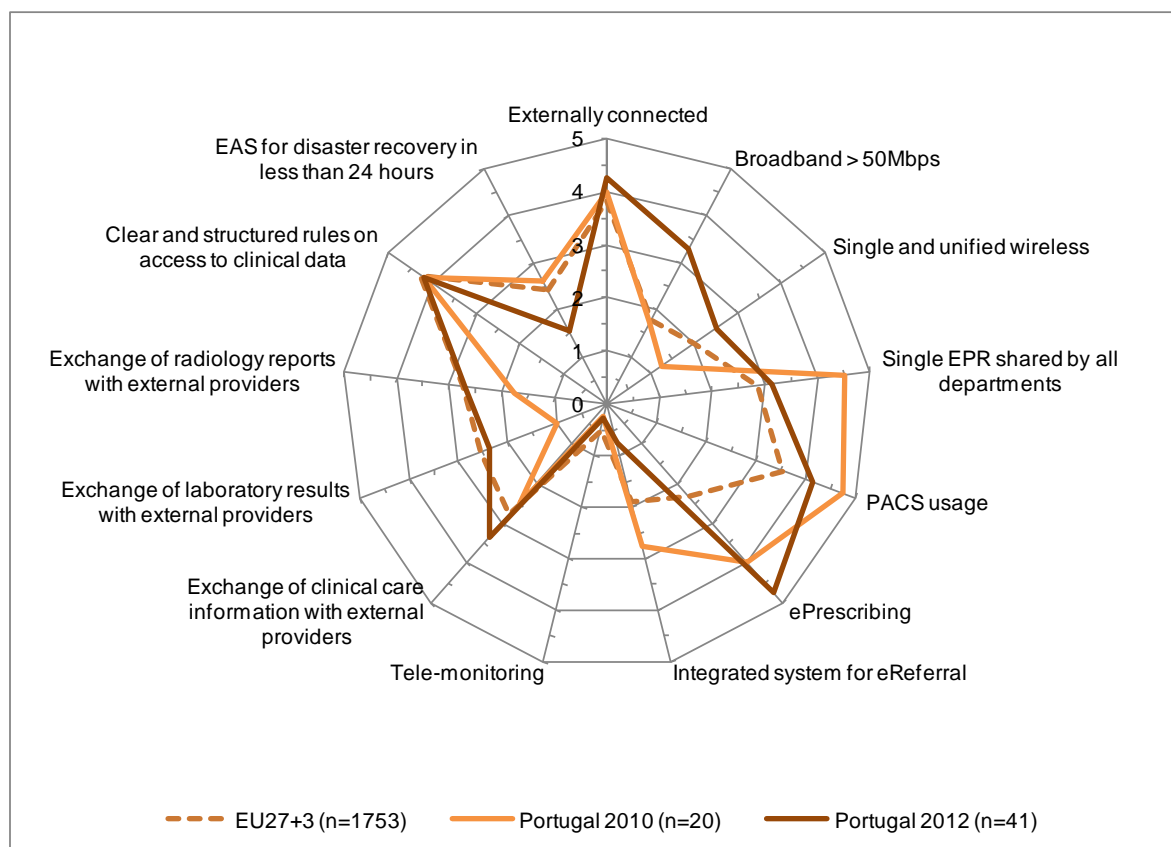
eHealth indicators - Portugal	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	9%	5%
Broadband > 50Mbps	30%	31%
Single and unified wireless	10%	25%
Single EPR shared by all departments	6%	-28%
PACS usage	12%	-12%
ePrescribing	48%	15%
Integrated system for eReferral	-23%	-40%
Tele-monitoring	-5%	0%
Exchange of clinical care information with external providers	11%	17%
Exchange of laboratory results with external providers	-4%	28%
Exchange of radiology reports with external providers	-1%	19%
Clear and structured rules on access to clinical data	-1%	0%
EAS for disaster recovery in less than 24 hours	-17%	-22%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

397 Portugal is close to the European average in its eHealth profile. However, the gains over and above the European average are not evenly distributed, with "*ePrescribing*" alone standing 48% above the EU27+3 average. Similarly, "*Broadband > 50Mbps*" was 30% above the average, with most other areas varying by less than 15%.

Change in the Portuguese eHealth profile

398 The greatest gains since 2010 have been achieved in "*Broadband > 50Mbps*", "*Exchange of laboratory results with external providers*" and "*Single and unified wireless*" which delivered 31%, 28% and 25% growth respectively. However, "*Single EPR shared by all departments*" and "*Integrated system for eReferral*" posted negative growth, at -28% and -40% respectively.

Figure 152: Portuguese acute hospitals eHealth profile by ownership
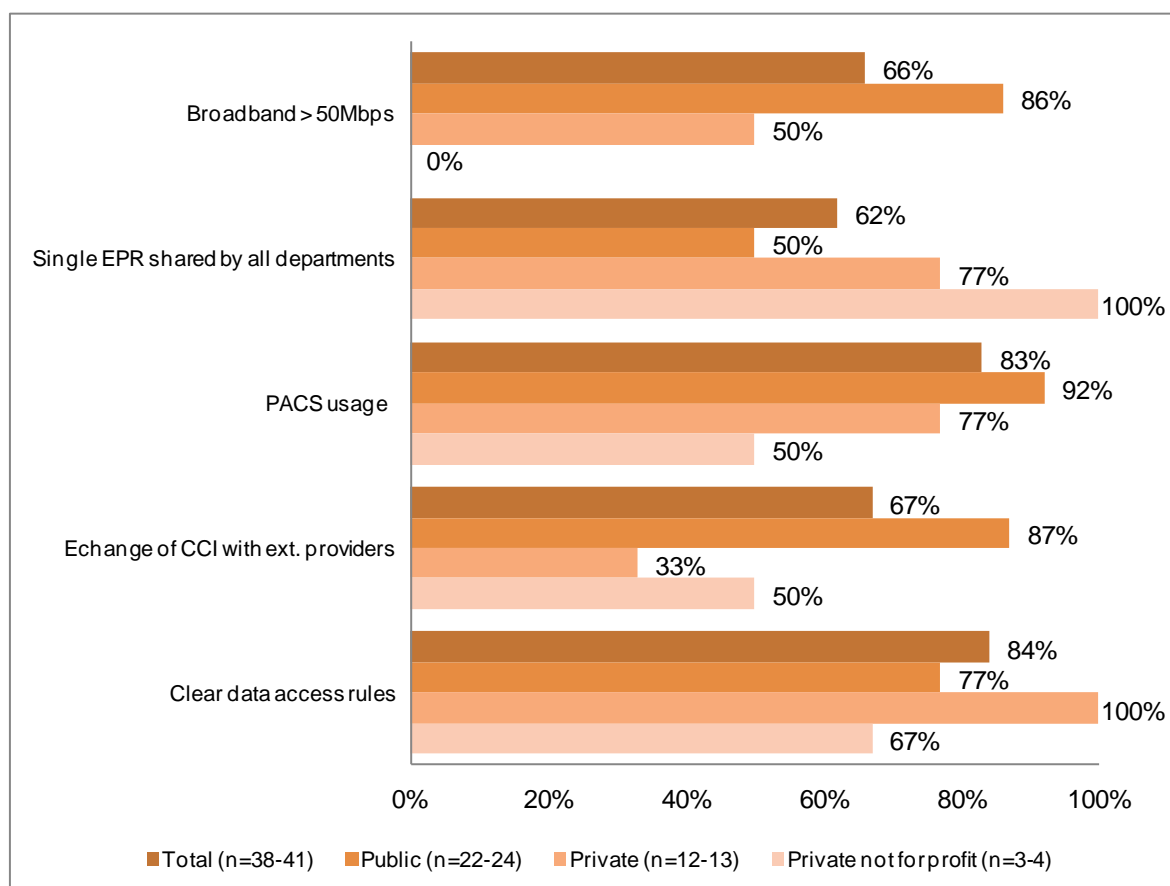
Note: Results are based on valid answers only - category bases may vary from the total reported here.

399 Public acute hospitals in Portugal appear to be the best endowed in terms of eHealth capabilities, with Public hospitals leading by a wide margin in three areas: "*Broadband > 50Mbps*", "*PACS usage*" and "*Exchange of clinical care information with external providers*". However, Private not for profit acute hospitals led notably in "*Single EPR shared by all departments*" at 100%, while Private hospitals led in "*Clear and structured rules on access to clinical data*", also at 100%.

211

Figure 153: Portuguese acute hospitals eHealth profile by size
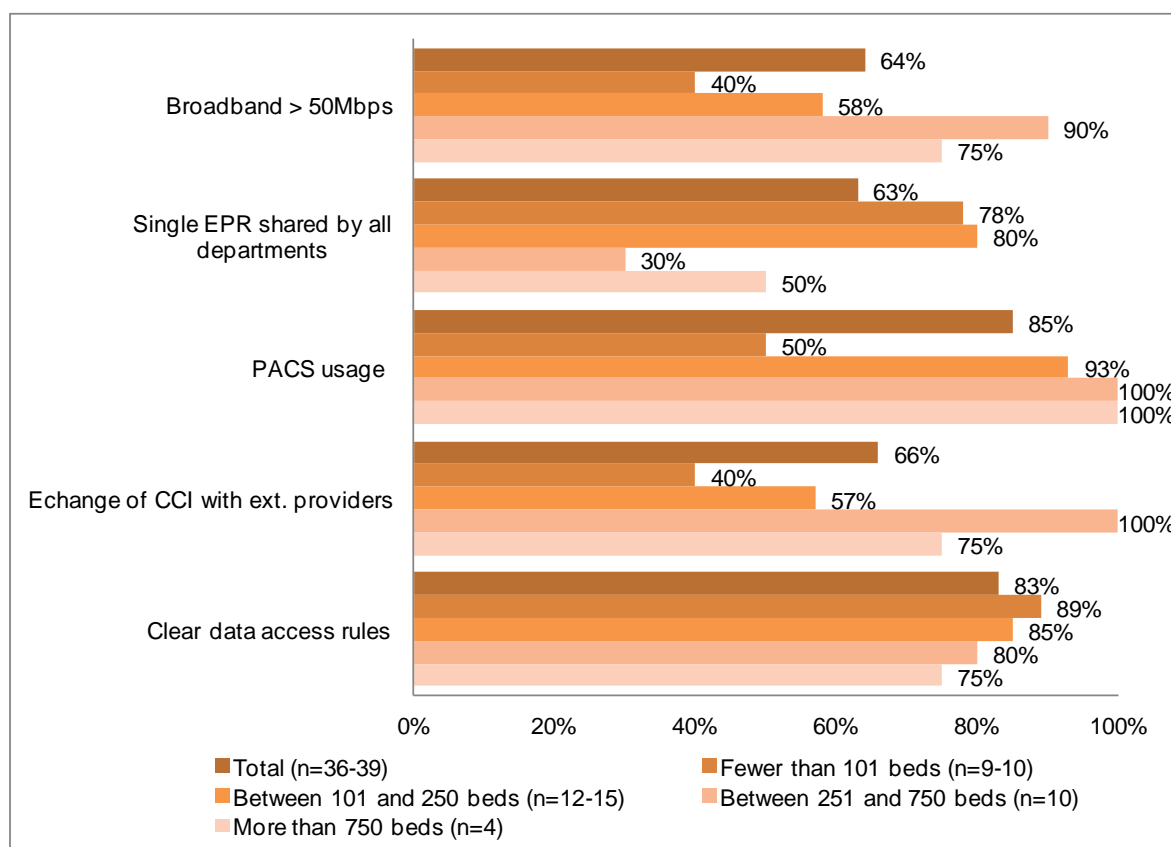
Note: Results are based on valid answers only - category bases may vary from the total reported here.

400 The distribution of eHealth capabilities appears to be relatively even in terms of hospital size. Although the largest hospital segments (Between 251 and 750 beds, as well as More than 750 beds) have leadership positions in "*Broadband > 50Mbps*", "*PACS usage*" and "*Exchange of clinical care information with external providers*", smaller hospitals lead in "*Clear and structured rules on access to clinical data*" as well as "*Single EPR shared by all departments*". Significantly, the smallest segment (Fewer than 101 beds) underperformed in three of the five categories by a wide margin (between 50 and 60 percentage points).

Figure 154: Difference between NUTS 2 level and country-level results

	Broadband > 50Mbps	Single EPR shared by all departments	PACS usage	Exchange of clinical care information with external providers	Clear and structured rules on access to clinical data
Total Portugal (n=41)	66%	62%	83%	67%	84%
PT11 - Norte (n=17)	50%	75%	76%	56%	87%
PT16 - Centro (PT) (n=10)	80%	40%	90%	70%	78%
PT17 - Lisboa (n=10)	67%	70%	80%	70%	90%
PT18 - Alentejo (n=4)	100%	50%	100%	100%	75%

Note: Results are based on valid answers only - bases may vary from the total observations reported here. No statistically significant difference between regions and the national level (at the 95% and 99% confidence level).

401 The NUTS 2 level analysis of five eHealth indicators for Portugal shows that *PT18 – Alentejo* led by a wide margin, displaying 100% penetration for "*Broadband > 50Mbps*", "*PACS usage*" and "*Exchange of clinical care information with external providers*". However, in the other areas under review, "*Single EPR shared by all departments*" and "*Clear and structured rules on access to clinical data*", PT18 – Alentejo actually underperformed in contrast to NUTS 2 regions. Across all NUTS 2 regions, "*PACS usage*" and "*Clear and structured rules on access to clinical data*" were the highest scoring eHealth indicators.

5.2.25 Romania's acute hospitals eHealth profile

402 1,042 hospitals were identified in Romania. Within this sample, 612 (59%) completed the screener part of the questionnaire and, of these, 16% qualified as acute care hospitals. Of the 166 screened in, 85 acute hospitals (51%) completed the survey.

403 All hospital size categories size experienced a balanced increase in terms of number of hospitals between 2010 and 2012.

Table 55: Romanian breakdown by size of hospital

Romania	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	166	31	53	49	29	4
		19%	32%	30%	17%	2%
2012	85	15	27	28	15	-
		18%	32%	33%	18%	-
2010	38	8	13	10	6	1
		21%	34%	26%	16%	3%

404 Romania only counts 82 Public hospitals and 3 Private hospitals. Public hospitals increased from 37 hospitals in 2010 to 82 hospitals in 2012.

Table 56: Romanian breakdown by ownership type

Romania	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	166	157	7	-	2
		95%	4%	-	1%
2012	85	82	3	-	-
		96%	4%	-	-
2010	38	37	-	-	1
		97%	-	-	3%

Figure 155: Romanian acute hospital eHealth profile
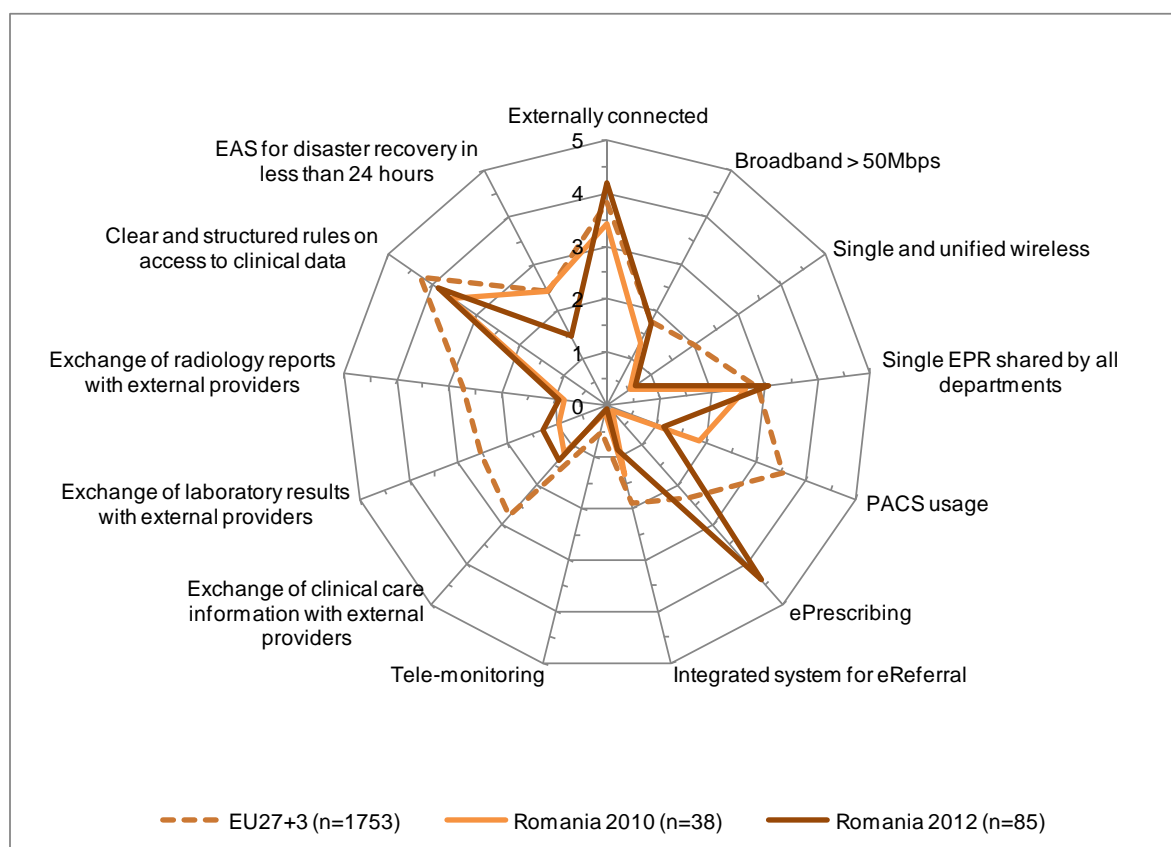
eHealth indicators - Romania	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	7%	15%
Broadband > 50Mbps	0%	9%
Single and unified wireless	-27%	2%
Single EPR shared by all departments	4%	8%
PACS usage	-48%	-14%
ePrescribing	41%	85%
Integrated system for eReferral	-20%	-10%
Tele-monitoring	-9%	-1%
Exchange of clinical care information with external providers	-28%	3%
Exchange of laboratory results with external providers	-26%	6%
Exchange of radiology reports with external providers	-37%	2%
Clear and structured rules on access to clinical data	-8%	6%
EAS for disaster recovery in less than 24 hours	-19%	-19%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Romanian eHealth profile in EU27+3

405   Romania is significantly behind the European average in eHealth. Five areas in particular are responsible
        for the majority of this lag: "*Single and unified wireless*", "*PACS usage*", "*Exchange of clinical care
        information with external providers*", "*Exchange of laboratory results with external providers*" and
        "*Exchange of radiology reports with external providers*". The country performs well in "*ePrescribing*",
        however, which is 41% ahead of the average.

Change in the Romanian eHealth profile

406   Despite its poor profile by contrast to the European average, Romania's eHealth profile is improving.
        However, this growth has been uneven. The largest growth was recorded in the area of "*ePrescribing*",
        which is 85% ahead of the 2010 position. All other areas have registered changes, both positive and
        negative, not exceeding 15%, with many marginal variations.

Figure 156: Romanian acute hospitals eHealth profile by ownership
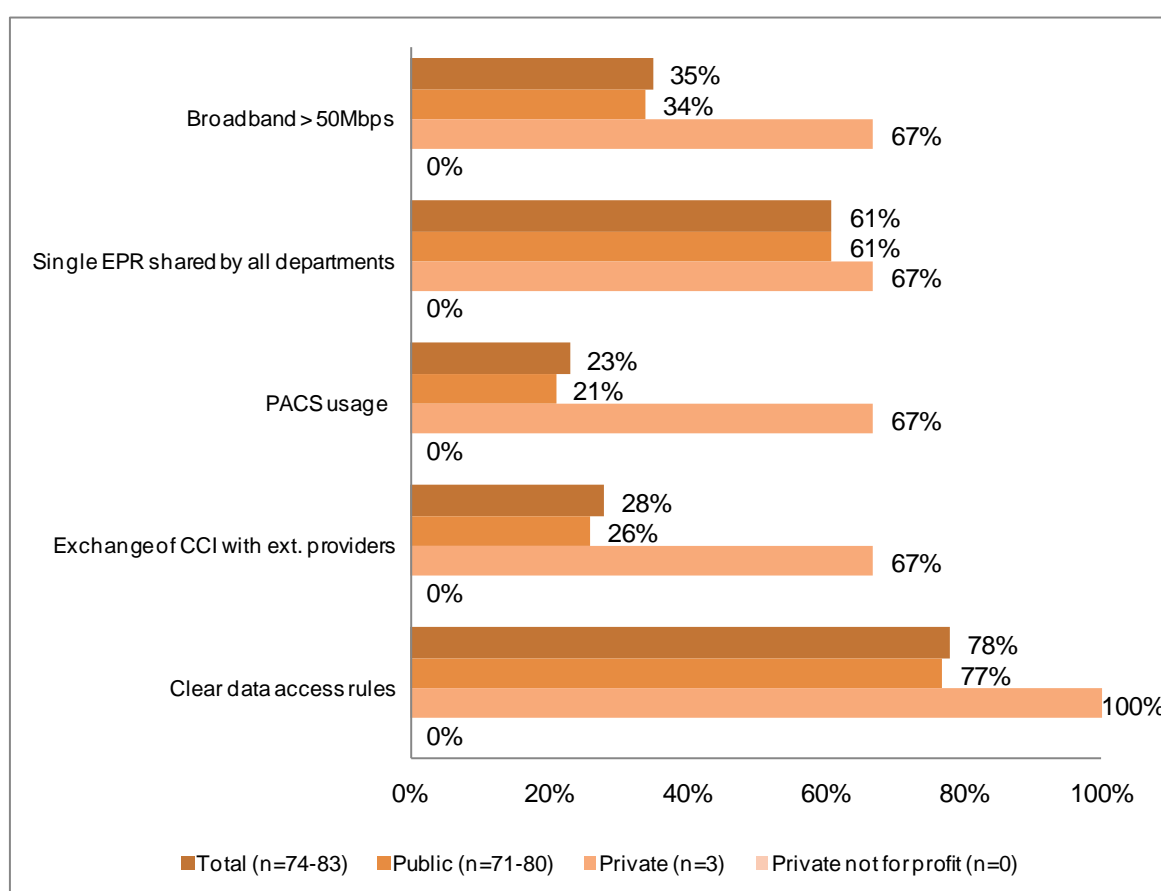
Note: Results are based on valid answers only - category bases may vary from the total reported here.

407   When looking at the ownership type of Romanian acute hospitals, we can see that while Private not for
        profit acute hospitals return no results, the private acute hospital sector is far better performing in the
        areas of "*Broadband > 50Mbps*", "*Single EPR shared by all departments*", "*PACS usage*", "*Exchange of
        clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*".
        In addition to this, the gap in performance is quite significant in four of these areas, ranging from a 46%
        difference in "*PACS usage*" to a 23% difference in "*Clear and structured rules on access to clinical data*".
        Only in the area of "*Single EPR shared by all departments*" do public and private hospitals have
        comparable performances.

Figure 157: Romanian acute hospitals eHealth profile by size
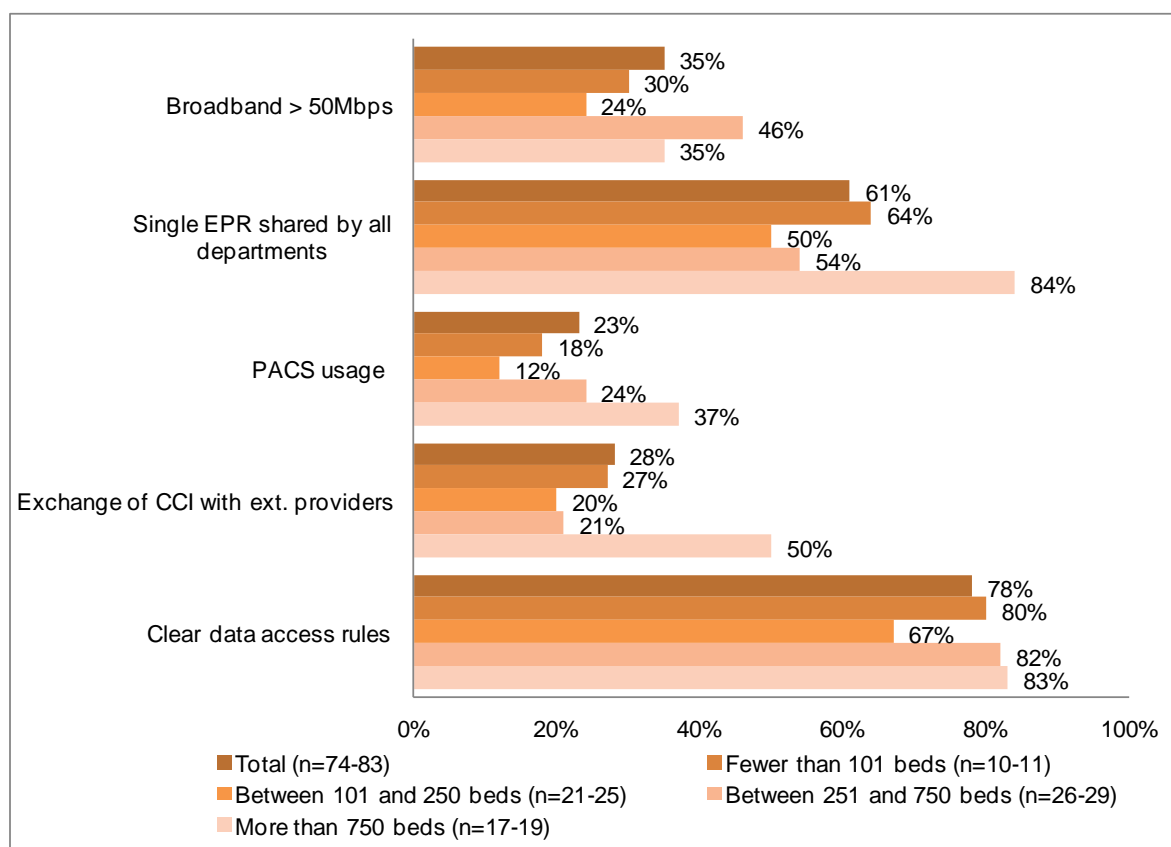
Note: Results are based on valid answers only - category bases may vary from the total reported here.

408 In terms of hospital size, the very largest segment (More than 750 beds) registered much better performance than the smaller hospitals, with leading values in four of the five categories under review. Unusually, however, the worst performing category is not the smallest segment (Fewer than 101 beds) but the next largest segment of Between 101 and 250 beds. This group of hospitals came last in every single category examined. The smallest segment, by contrast, has a roughly similar experience to that of the second largest category (Between 251 and 750 beds). The values recorded by these groups do not differ widely.

5.2.26 Slovakia's acute hospitals eHealth profile

409 391 hospitals were identified in Slovakia. Within this sample, 187 (48%) completed the screener part of the questionnaire and, of these, 18% qualified as acute care hospitals. Of the 72 screened in, 33 acute hospitals (46%) completed the survey.

410 The category between 251 and 750 beds recorded the most striking increase in terms of number of hospitals. All the other categories experienced a balanced increase between 2010 and 2012.

Table 57: Slovakian breakdown by size of hospital

Slovakia	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	72	11	19	30	5	7
		15%	26%	42%	7%	10%
2012	33	6	10	14	3	-
		18%	30%	42%	9%	-
2010	12	4	4	1	2	1
		33%	33%	8%	17%	8%

411 Public and private hospitals have both increased in number of hospitals between 2010 and 2012 looking at the breakdown by ownership type.

Table 58: Slovakian breakdown by ownership type

Slovakia	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	72	43	14	9	6
		60%	19%	13%	8%
2012	33	22	8	3	-
		67%	24%	9%	-
2010	12	3	2	6	1
		25%	17%	50%	8%

Figure 158: Slovakian acute hospital eHealth profile
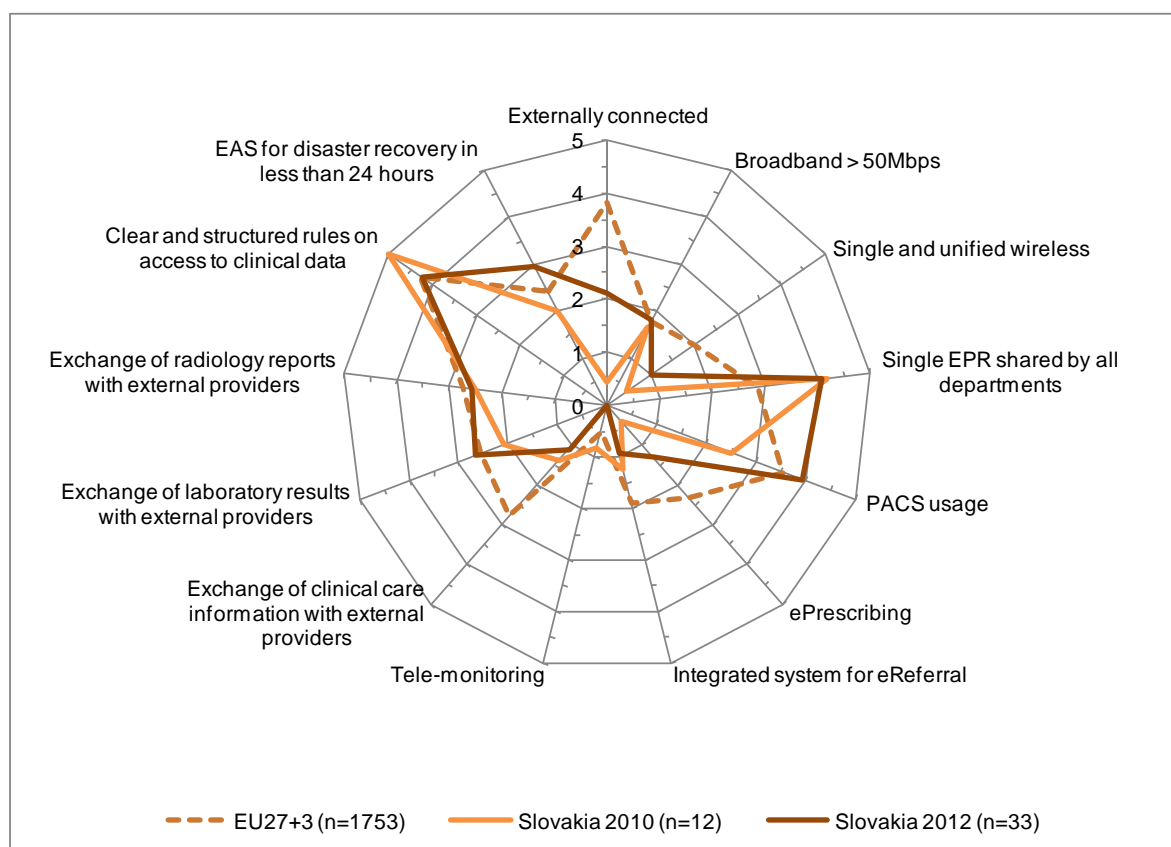
eHealth indicators - Slovakia	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	-34%	33%
Broadband > 50Mbps	0%	1%
Single and unified wireless	-5%	3%
Single EPR shared by all departments	6%	0%
PACS usage	2%	7%
ePrescribing	-5%	4%
Integrated system for eReferral	-5%	-2%
Tele-monitoring	-3%	-4%
Exchange of clinical care information with external providers	-8%	-1%
Exchange of laboratory results with external providers	0%	3%
Exchange of radiology reports with external providers	-1%	0%
Clear and structured rules on access to clinical data	0%	-4%
EAS for disaster recovery in less than 24 hours	3%	5%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Slovakian eHealth profile in EU27+3

412   Slovakia trails behind the European average in eHealth. Four specific areas account for most of this lag: "*Externally connected*" (-34%), "*Single and unified wireless*" (-5%), "*ePrescribing*" (-5%) and "*Exchange of clinical care information with external providers*" (-8%). However, Slovakia is not universally behind the European average in all areas, with five of the 13 areas very close to or exceeding the European average.

Change in the Slovakian eHealth profile

413   Although it is still behind the European average, Slovakia has improved on its 2010 eHealth profile. The major areas of increase were "*Externally connected*" and "*PACS usage*", which had gains of 133% and 7% respectively. "*EAS for disaster recovery in less than 24 hours*" also improved, albeit by only 5%.

Figure 159: Slovakian acute hospitals eHealth profile by ownership
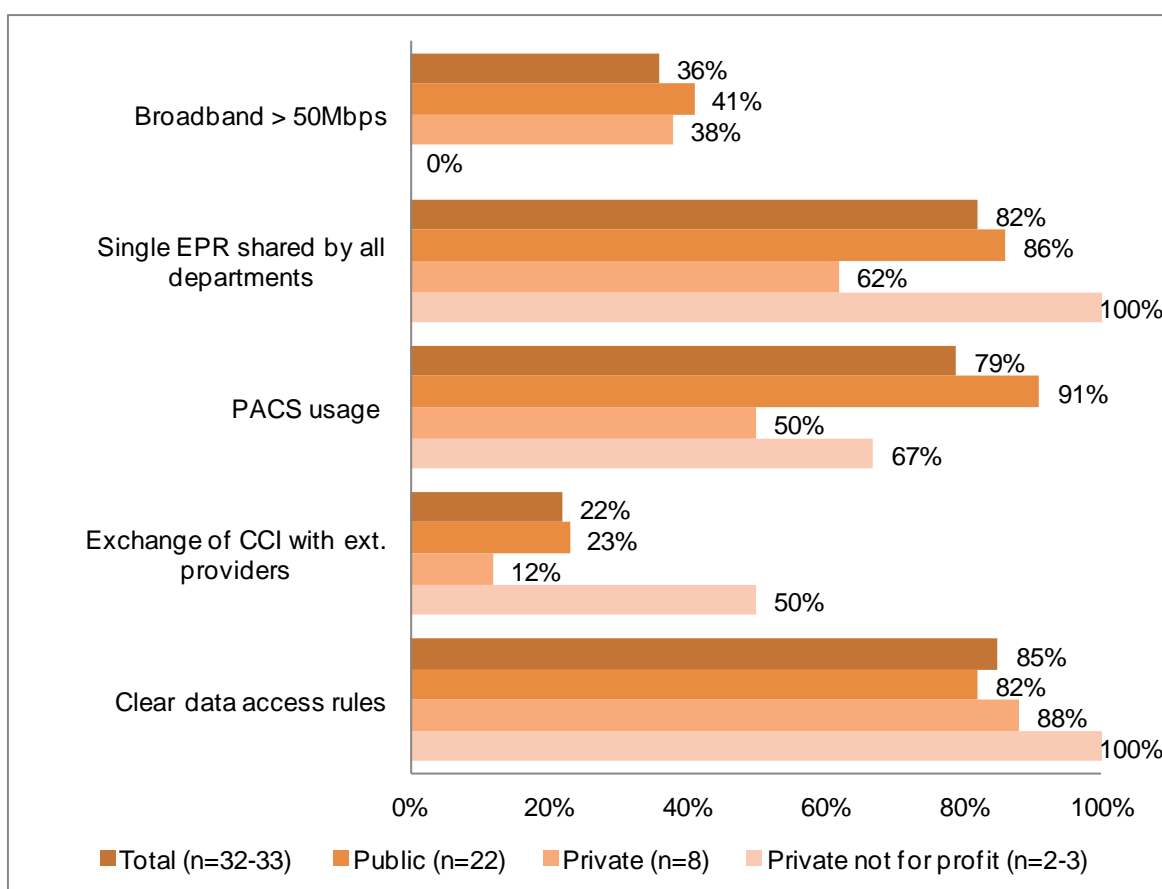
Note: Results are based on valid answers only - category bases may vary from the total reported here.

414   Type of ownership does not appear to affect eHealth capabilities in any definite way in Slovakia, with both Private not for profit and Public hospitals leading in various different areas. While Private hospitals underperform in four of five areas, the disparity in performance levels in three of these areas is not very high, for example only 3% behind in "*Broadband > 50Mbps*", 17% behind in "*PACS usage*" and 18% behind in "*Clear and structured rules on access to clinical data*".

Figure 160: Slovakian acute hospitals eHealth profile by size
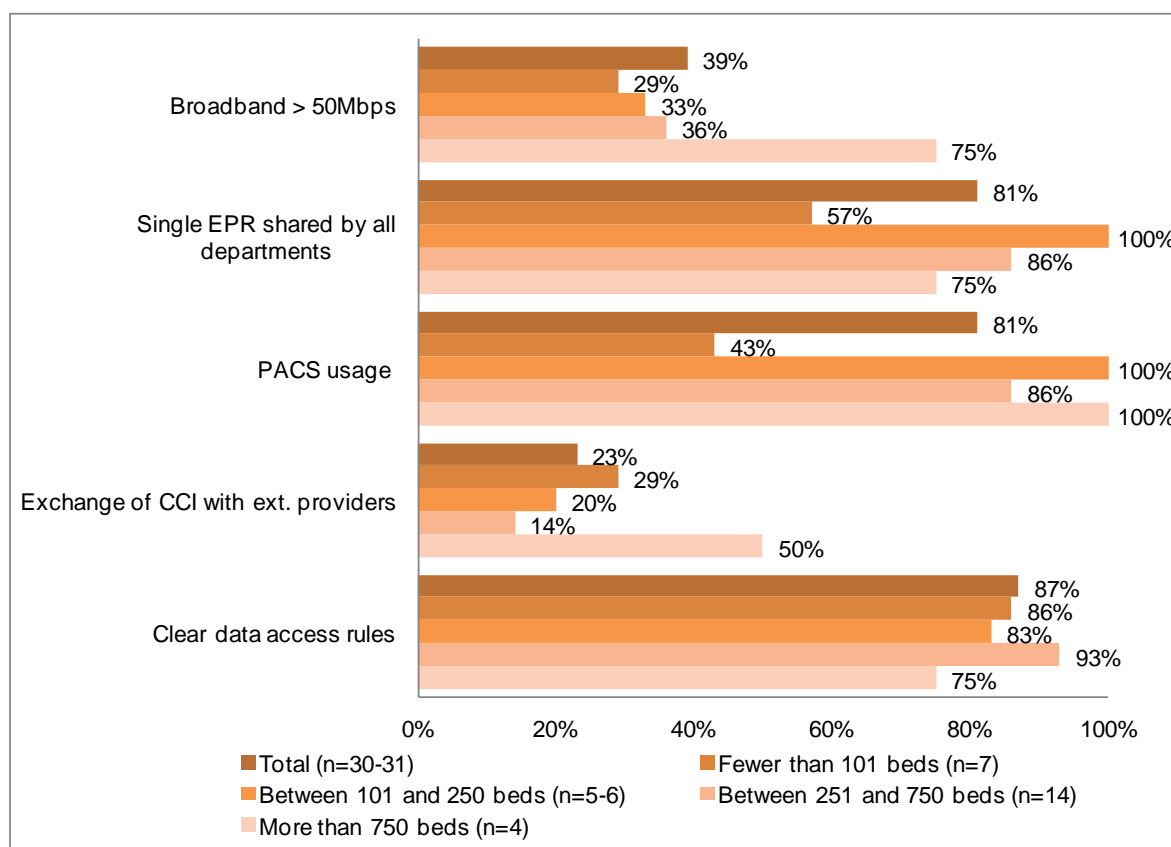
Note: Results are based on valid answers only - category bases may vary from the total reported here.

415 Scale does not appear to be a definite factor either in deciding the eHealth development of acute hospitals in Slovakia. While the largest hospitals have a clear advantage in two areas, "*Broadband > 50Mbps*" and "*Exchange of clinical care information with external providers*", acute hospitals in the segment of Between 101 and 250 beds perform at 100% levels in two areas, "*Single EPR shared by all departments*" and "*PACS usage*". Hospitals of all sizes perform well in the final category, "*Clear and structured rules on access to clinical data*", and in this area, the maximum variation between results is 18% between the lowest and highest performers. By contrast, the greatest disparity in performance can be seen in "*Broadband > 50Mbps*", "*PACS usage*" and "*Exchange of clinical care information with external providers*".

5.2.27 Slovenia's acute hospitals eHealth profile

416   186 hospitals were identified in Slovenia. Within this sample, 104 (56%) completed the screener part of the questionnaire and, of these, 8% qualified as acute care hospitals. Of the 14 screened in, 6 acute hospitals (43%) completed the survey.

417   The breakdown by size between 2010 and 2012 remains approximately unchanged.

Table 59: Slovenian breakdown by size of hospital

Slovenia	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	14	2	5	2	3	2
		14%	36%	14%	21%	14%
2012	6	-	3	2	1	-
		-	50%	33%	17%	-
2010	3	1	1	1	-	-
		33%	33%	33%	-	-

418   The breakdown by ownership type between 2010 and 2012 remains approximately unchanged.

Table 60: Slovenian breakdown by ownership type

Slovenia	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	14	12	1	-	1
		86%	7%	-	7%
2012	6	6	-	-	-
		100%	-	-	-
2010	3	3	-	-	-
		100%	-	-	-

Figure 161: Slovenian acute hospital eHealth profile
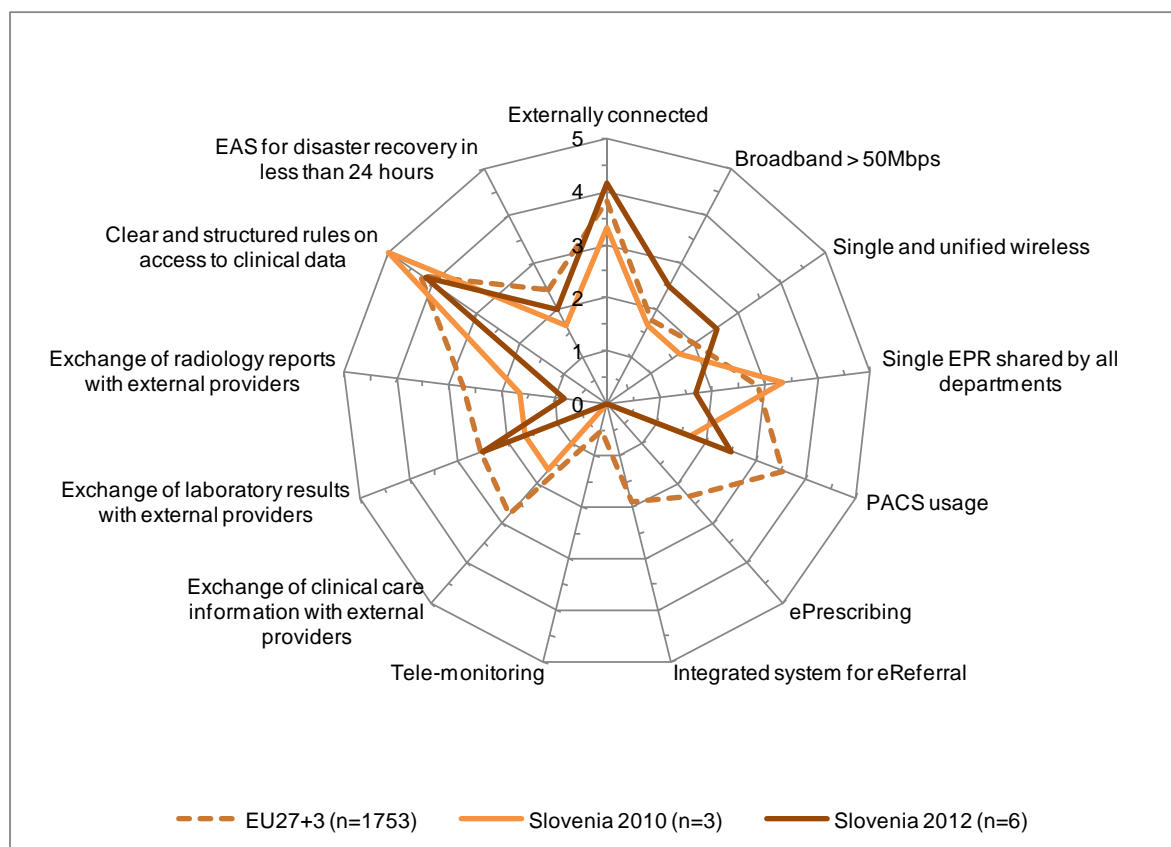
eHealth indicators - Slovenia	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	7%	17%
Broadband > 50Mbps	14%	17%
Single and unified wireless	10%	17%
Single EPR shared by all departments	-24%	-33%
PACS usage	-21%	17%
ePrescribing	-47%	0%
Integrated system for eReferral	-38%	0%
Tele-monitoring	-10%	0%
Exchange of clinical care information with external providers	-55%	-33%
Exchange of laboratory results with external providers	-1%	17%
Exchange of radiology reports with external providers	-38%	-17%
Clear and structured rules on access to clinical data	-2%	-17%
EAS for disaster recovery in less than 24 hours	-8%	7%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Slovenian eHealth profile in EU27+3

419　Slovenia is behind the average European values in eHealth in ten of the 13 categories, and is less than one point ahead in three categories ("*Externally connected*", "*Broadband > 50Mbps*" and "*Single and unified wireless*"). Globally Slovenia trails behind the European average, with the biggest disparities evident in "*ePrescribing*" (-47%), "*Integrated system for eReferral*" (-38%), "*Exchange of clinical care information with external providers*" (-45%) and "*Exchange of radiology reports with external providers*" (-38%).

Change in the Slovenian eHealth profile

420　Slovenia's eHealth profile has changed marginally since 2010. Six areas have gained less than one point, while four areas have dropped in value, with two of these exceeding one point ("*Single EPR shared by all departments*" and "*Exchange of clinical care information with external providers*" both lost -33% since 2010). Three other areas recorded no change.

421　As only public hospitals recorded values in relation to ownership type, no contrast is possible between other ownership types in Slovenia. The highest value recorded by public hospitals across the five areas examined was 83% for "Clear and structured rules on access to clinical data". "Broadband > 50Mbps" and "PACS usage" scored 50% while "Single EPR shared by all departments" recorded 33%. No data was recorded for "Exchange of clinical care information with external providers".

Figure 162: Slovenian acute hospitals eHealth profile by size
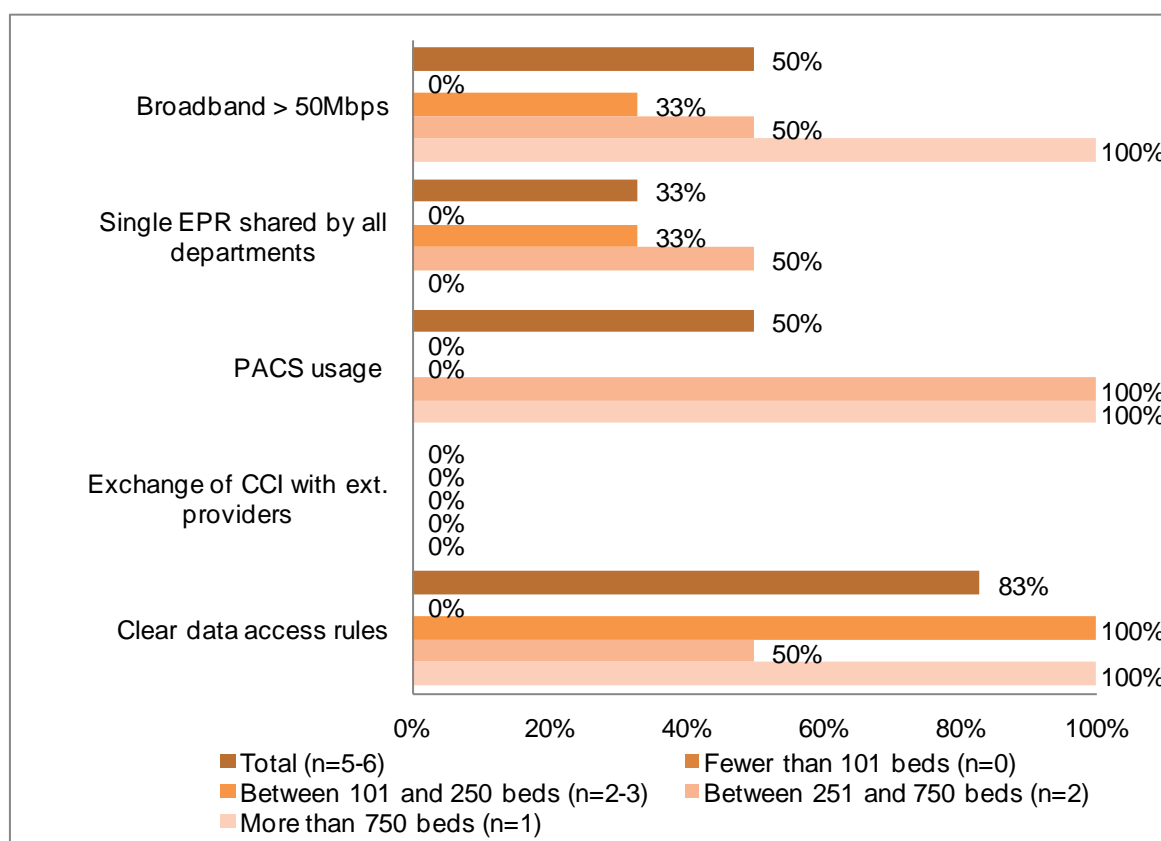
Note: Results are based on valid answers only - category bases may vary from the total reported here.

422　The scale of hospitals in Slovenia may have some impact on the development of eHealth capabilities, although the effect is not necessarily clear cut. While the Slovenian acute hospitals belonging to the segment More than 750 beds perform at 100% in three categories of four that record data ("*Exchange of clinical care information with external providers*" returns no data), the smallest segment in Slovenia (Between 101 and 250 beds, no data is recorded for Fewer than 101 beds) reached 100% in only one category ("*Clear and structured rules on access to clinical data*"), and recorded the lowest values in the remaining two categories for which data is available. Hospitals of the segment Between 251 and 750 beds also underperformed in three categories, but recorded high performance in "*PACS usage*" (100%).

223

5.2.28 Spain's acute hospitals eHealth profile

423 1,311 hospitals were identified in Spain. Within this sample, 845 (64%) completed the screener part of the questionnaire and, of these, 36% qualified as acute care hospitals. Of the 478 screened in, 124 acute hospitals (26%) completed the survey.

424 While the smallest size categories experienced an increase in the number of hospitals between 2010 and 2012, the biggest hospital size categories registered a decrease looking at the breakdown by size for the same period.

Table 61: Spanish breakdown by size of hospital

Spain	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	478	121	127	70	32	128
		25%	27%	15%	7%	27%
2012	124	30	36	19	6	33
		24%	29%	15%	5%	27%
2010	90	19	27	26	16	2
		21%	30%	29%	18%	2%

425 Private hospitals accounted for the strongest growth over the period, with their number increasing from 16 establishments in 2010 to 44 establishments in 2012.

Table 62: Spanish breakdown by ownership type

Spain	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	478	225	157	50	46
		47%	33%	10%	10%
2012	124	67	44	13	-
		54%	35%	10%	-
2010	90	62	16	11	1
		69%	18%	12%	1%

Figure 163: Spanish acute hospital eHealth profile
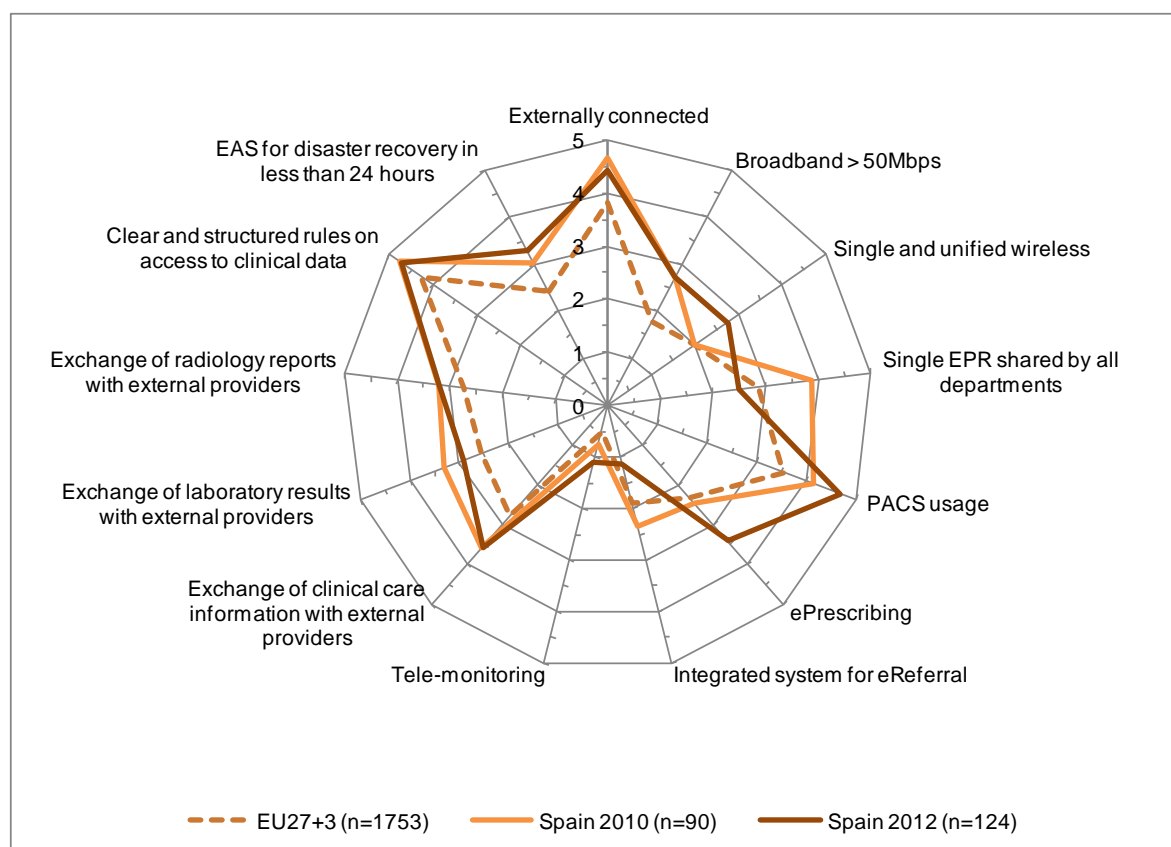
eHealth indicators - Spain	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	12%	-5%
Broadband > 50Mbps	19%	0%
Single and unified wireless	15%	15%
Single EPR shared by all departments	-7%	-28%
PACS usage	23%	10%
ePrescribing	21%	19%
Integrated system for eReferral	-15%	-24%
Tele-monitoring	12%	7%
Exchange of clinical care information with external providers	16%	-1%
Exchange of laboratory results with external providers	7%	-8%
Exchange of radiology reports with external providers	9%	0%
Clear and structured rules on access to clinical data	9%	-1%
EAS for disaster recovery in less than 24 hours	17%	5%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the Spanish eHealth profile in EU27+3

426 Spain is comfortably ahead of the European average in eHealth. In addition to this, the country also matches the European average profile quite closely, and the distribution of its eHealth capabilities is quite even. For example, only "*PACS usage*" and "*ePrescribing*" recorded scores of 20% or more above the European average ("*PACS usage*" is 23% above and "*ePrescribing*" is 21% above).

Change in the Spanish eHealth profile

427 Despite being ahead of the EU average, Spain's eHealth profile has contracted slightly since 2010. However, the contraction has also been evenly distributed, with seven areas registering some declines (the highest being "*Single EPR shared by all departments*" and "*Integrated system for eReferral*" at –27% and –24%).

Figure 164: Spanish acute hospitals eHealth profile by ownership
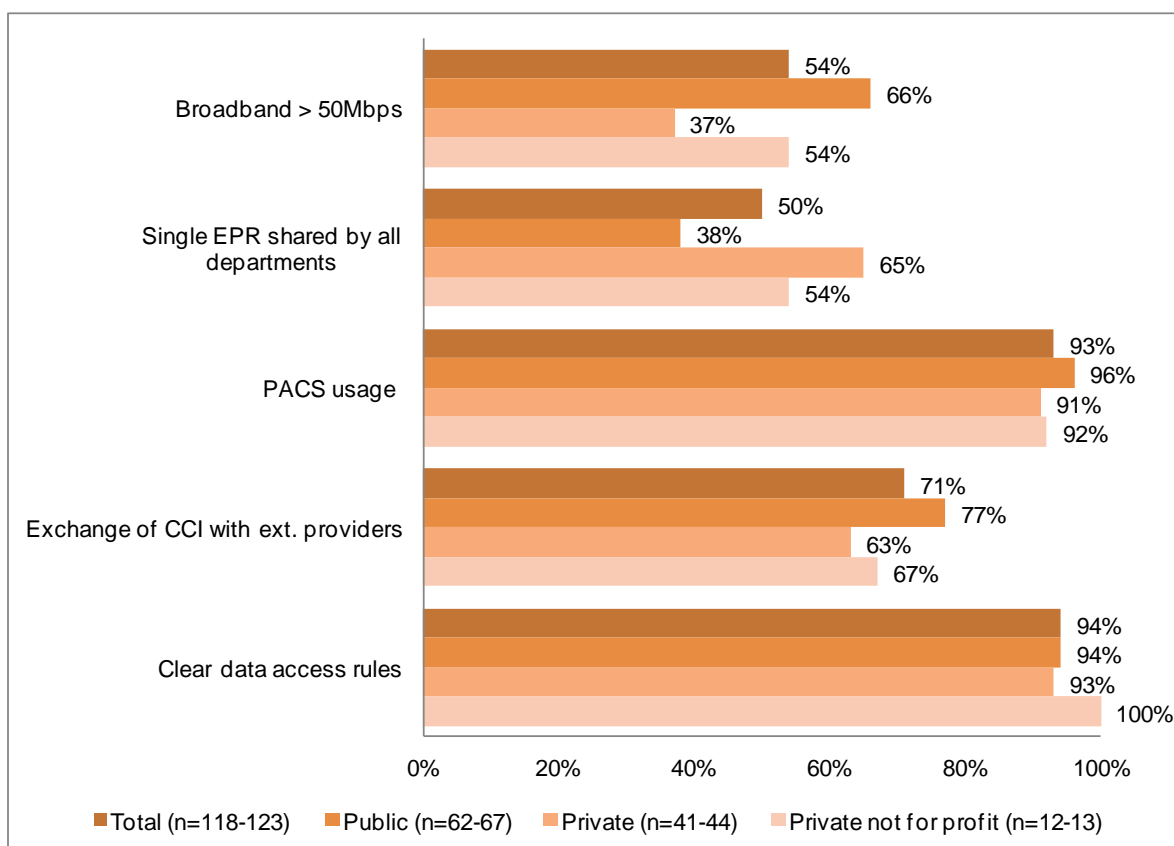
Note: Results are based on valid answers only - category bases may vary from the total reported here.

428 Type of ownership does not appear to influence the development of eHealth capabilities across Spanish acute hospitals. For example, in "*PACS usage*" and "*Clear and structured rules on access to clinical data*" values are quite closely grouped, with a maximum variation of 7% between the lowest and highest performer. More variation can be seen in "*Broadband > 50Mbps*", "*Single EPR shared by all departments*" and "*Exchange of clinical care information with external providers*", and in these categories the lead position is twice held by Public hospitals, and once by Private hospitals.

Figure 165: Spanish acute hospitals eHealth profile by size
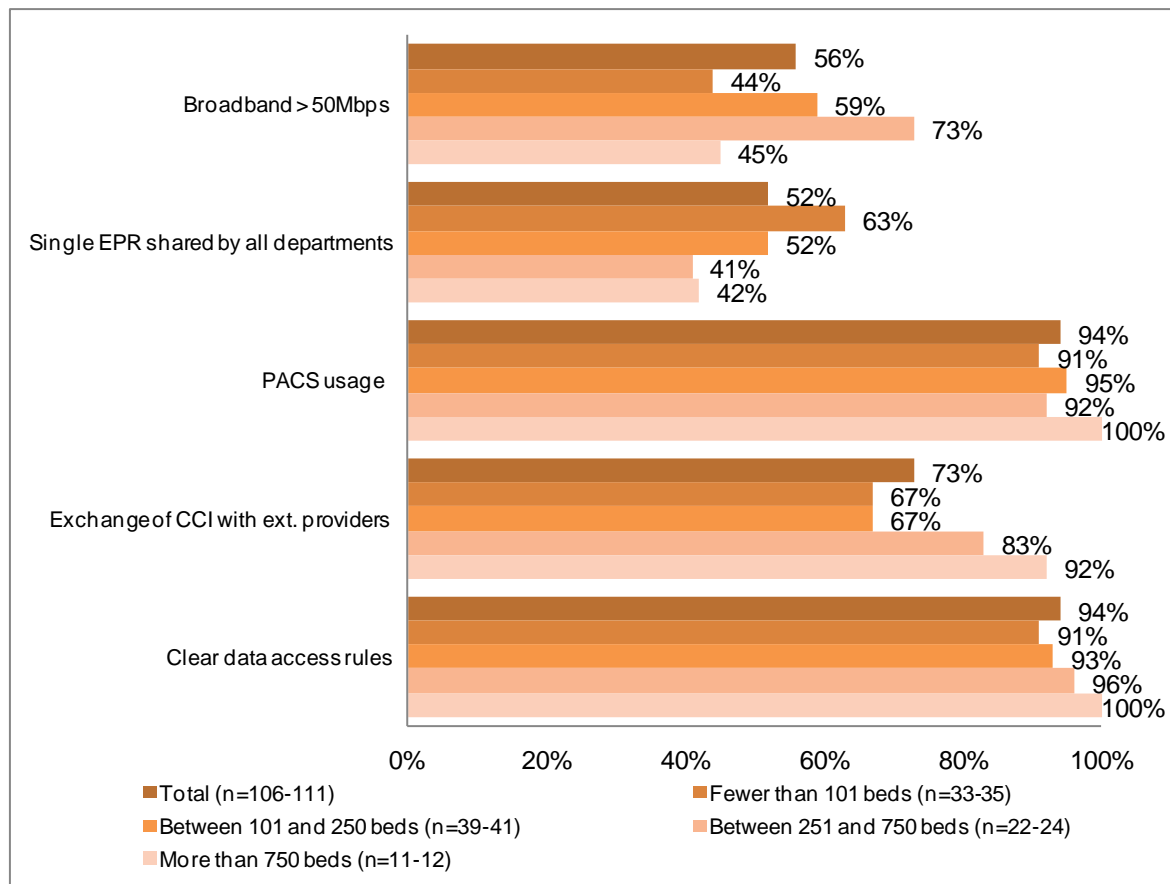
Note: Results are based on valid answers only - category bases may vary from the total reported here.

429   Scale appears to be slightly influential in Spanish acute hospitals, but not universally so. A certain advantage appears to be conferred upon larger hospital segments in three categories, "*Exchange of clinical care information with external providers*", "*Clear and structured rules on access to clinical data*" and "*PACS usage*", with acute hospitals of More than 750 beds leading in these areas. However, this segment performs much less well in "*Broadband > 50Mbps*" and "*Single EPR shared by all departments*", where performance is reversed and where significant gaps were noted between the highest and lowest performers.

Figure 166: Difference between NUTS 2 level and country-level results

	Broadband > 50Mbps	Single EPR shared by all departments	PACS usage	Exchange of clinical care information with external providers	Clear and structured rules on access to clinical data
Total Spain (n=124)	54%	50%	93%	71%	94%
ES11 - Galicia (n=8)	57%	38%	100%	88%	100%
ES21 - País Vasco (n=14)	54%	57%	93%	57%	100%
ES30 - Comunidad de Madrid (n=11)	55%	36%	91%	82%	100%
ES41 - Castilla y León (n=16)	40%	53%	94%	67%	94%
ES42 - Castilla-La Mancha (n=5)	80%	60%	100%	25%	100%
ES51 - Cataluña (n=19)	50%	63%	89%	76%	95%
ES52 - Comunidad Valenciana (n=14)	50%	38%	100%	93%	86%
ES61 - Andalucía (n=13)	46%	46%	85%	69%	100%
ES62 -Región de Murcia (n=5)	100%*	75%	100%	25%	100%
ES70 - Canarias (n=6)	50%	50%	100%	80%	100%

Note: Results are based on valid answers only - bases may vary from the total observations reported here

* Statistically significant difference between the region and the national level at the 95% confidence interval

430   In the context of the study, we have analysed 10 NUTS 2 regions for Spain. The only region showing a statistically significant difference when compared to the national results is *ES62 –Región de Murcia,* where all hospitals in the sample declared having full penetration of "*Broadband > 50Mbps*". This was the only region to record 100% of penetration in three areas: "*Broadband > 50Mbps*", "*PACS usage*" and "*Exchange of clinical care information with external providers*". Overall, "*Clear and structured rules on access to clinical data*" and "*PACS usage*" are the two areas which scored highest across these 10 NUTS 2 regions.

5.2.29   Sweden's acute hospitals eHealth profile

431   246 hospitals were identified in Sweden. Within this sample, 131 (53%) completed the screener part of the questionnaire and, of these, 32% qualified as acute care hospitals. Of the 78 screened in, 26 acute hospitals (33%) completed the survey.

432   All the size categories belonging to the breakdown by size registered an increase in number of hospitals between 2010 and 2012. This increase has been more evident for smaller hospital categories.

Table 63: Swedish breakdown by size of hospital

Sweden	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	78	18	13	17	9	21
		23%	17%	22%	12%	27%
2012	26	6	5	9	3	3
		23%	19%	35%	12%	12%
2010	8	1	1	3	2	1
		12%	12%	38%	25%	12%

433   Hospitals in Sweden are mainly public. This ownership category experienced an increase of 12 units, passing from 8 units in 2010 to 12 units in 2012.

Table 64: Swedish breakdown by ownership type

Sweden	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	78	59	2	3	14
		76%	3%	4%	18%
2012	26	20	-	2	4
		77%	-	8%	15%
2010	8	8	-	-	-
		100%	-	-	-

Figure 166: Swedish acute hospital eHealth profile
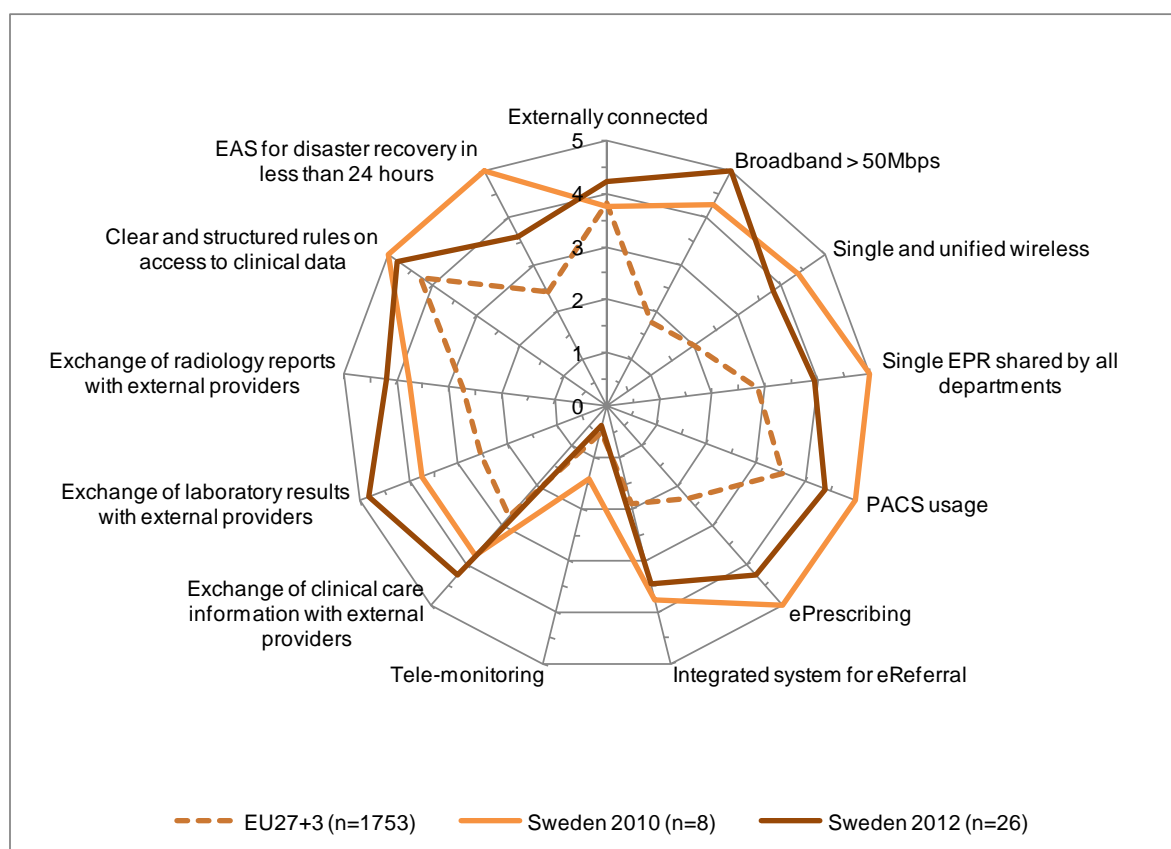
eHealth indicators - Sweden	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	8%	10%
Broadband > 50Mbps	64%	14%
Single and unified wireless	36%	-12%
Single EPR shared by all departments	22%	-21%
PACS usage	17%	-12%
ePrescribing	38%	-15%
Integrated system for eReferral	31%	-6%
Tele-monitoring	-3%	-21%
Exchange of clinical care information with external providers	29%	10%
Exchange of laboratory results with external providers	45%	21%
Exchange of radiology reports with external providers	29%	9%
Clear and structured rules on access to clinical data	11%	-4%
EAS for disaster recovery in less than 24 hours	24%	-28%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

230

Position of the Swedish eHealth profile in EU27+3

434   Sweden is one of the strongest eHealth performers in the sample. In fact, in all 13 indicators examined, Sweden ranked behind in only one area ("*Tele-monitoring*") and in this area is only marginally behind (–3% points). The areas within which Sweden is the most evolved by contrast to other countries within this study are "*Broadband > 50Mbps*" (64% ahead) and "*Exchange of laboratory results with external providers*" (64% ahead).

Change in the Swedish eHealth profile

435   Despite Sweden's strong position in eHealth, there has been some contraction of eHealth capabilities when contrasted with 2010 values. . The most notable decrease was recorded for in "*EAS for disaster recovery in less than 24 hours*", which dropped by –28%. In the 13 areas under review, five indicators posted modest growth, led by "*Exchange of laboratory results with external providers*" (which grew by 21%).

Figure 167: Swedish acute hospitals eHealth profile by ownership
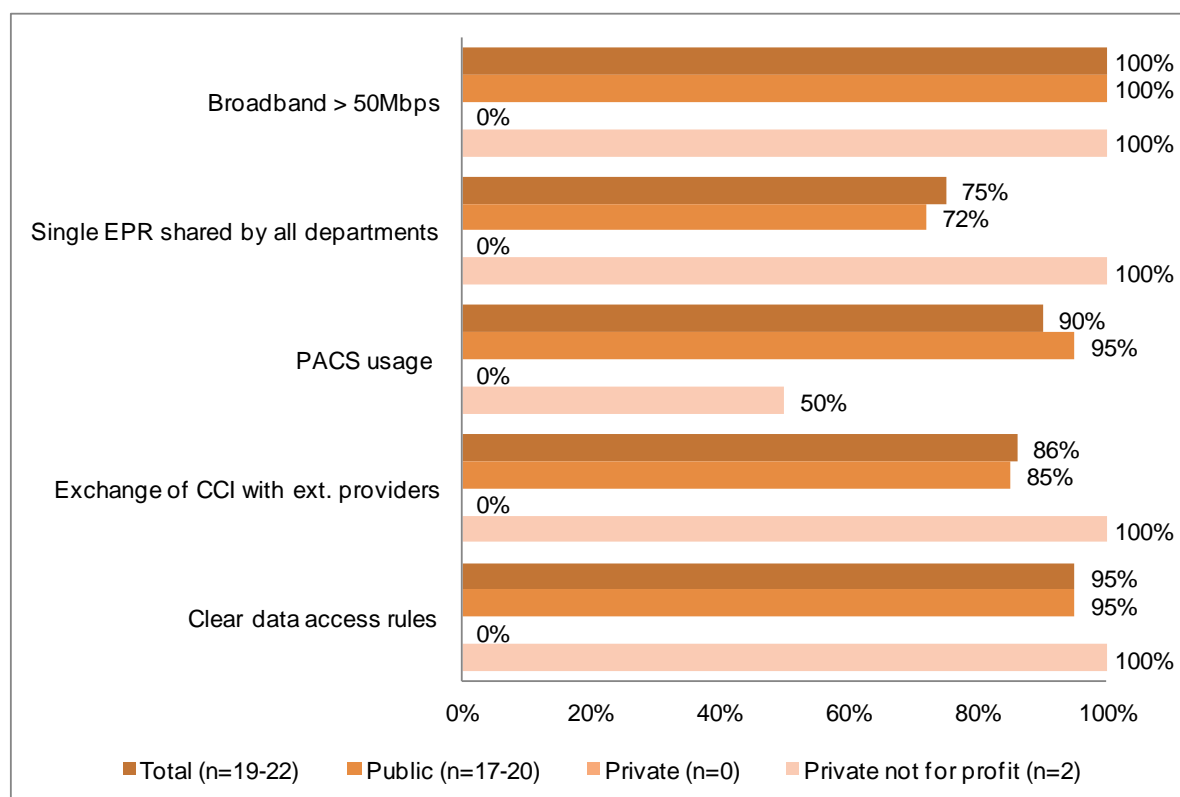
Note: Results are based on valid answers only - category bases may vary from the total reported here.

436   Only data for Public and Private not for profit hospitals were returned by our survey, and within this data we see that the latter segment of the market appears to consistently outperform. Private not for profit hospitals scored 100% in four of five indicators examined, while public hospitals lag by up to 28%. However, despite this result, the disparity of performance between the two segments is not dramatically high, and the worst disparity actually occurs in the area of "*PACS usage*", where Private not for profit hospitals only score 5o% against 95% for Public hospitals.

Figure 168: Swedish acute hospitals eHealth profile by size
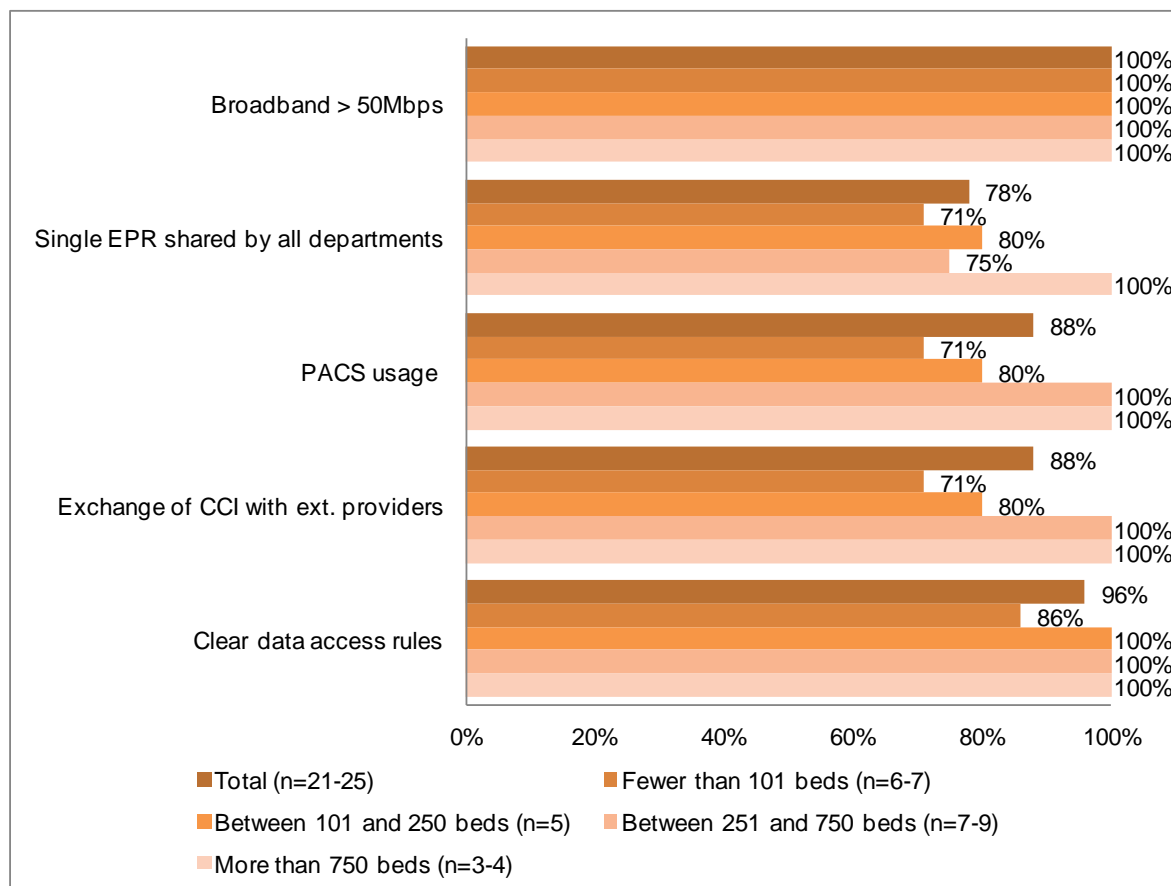
Note: Results are based on valid answers only - category bases may vary from the total reported here.

437 Scale does appear to affect the eHealth capabilities of Swedish acute hospitals, with the very largest hospital segment (More than 750 beds) scoring 100% in all five indicator areas. The lowest performing hospitals, by contrast, are the two smallest segments, being Fewer than 101 beds and Between 101 and 250 beds. These segments underperform in three of the five indicators, with gaps of 29% and 20% against the lead value in "*Single EPR shared by all departments*", "*PACS usage*" and "*Exchange of clinical care information with external providers*".

5.2.30   United Kingdom's acute hospitals eHealth profile

438   889 hospitals and NHS trusts were identified in the United Kingdom. Within this sample, 510 (57%) completed the screener part of the questionnaire and, of these, 11% qualified as acute care hospitals. Of the 102 screened in, 33 acute hospitals (32%) completed the survey.

439   Among the size categories belonging to the breakdown by size, the smallest hospital size category registered the highest increase in number of hospitals between 2010 and 2012 (from 9 to 36).

Table 65: United Kingdom breakdown by size of hospital

United Kingdom	N=	Fewer than 101 beds	Between 101 and 250 beds	Between 251 and 750 beds	More than 750 beds	Don't know/ No answer
Census	102	59	9	15	4	15
		58%	9%	15%	4%	15%
2012	69	36	7	16	5	5
		64%	9%	9%	3%	15%
2010	38	9	4	18	7	-
		24%	11%	47%	18%	-

440   Both public and private hospitals have increased in number between 2010 and 2012 looking at the breakdown by ownership type. The biggest increase in number is for public hospitals.

Table 66: United Kingdom breakdown by ownership type

United Kingdom	N=	Public	Private	Private not for profit	Don't know/ No answer
Census	102	55	43	2	2
		54%	42%	2%	2%
2012	69	55	13	1	-
		80%	19%	1%	-
2010	38	28	5	5	-
		74%	13%	13%	-

441   In order to guarantee the representativeness of the healthcare system in the United Kingdom, the 2012 results of the acute hospitals within NHS trusts have been duplicated based on the number of hospitals represented by the trust. After this duplication process, the United Kingdom counts 69 hospitals in its sample.

Figure 169: United Kingdom acute hospital eHealth profile
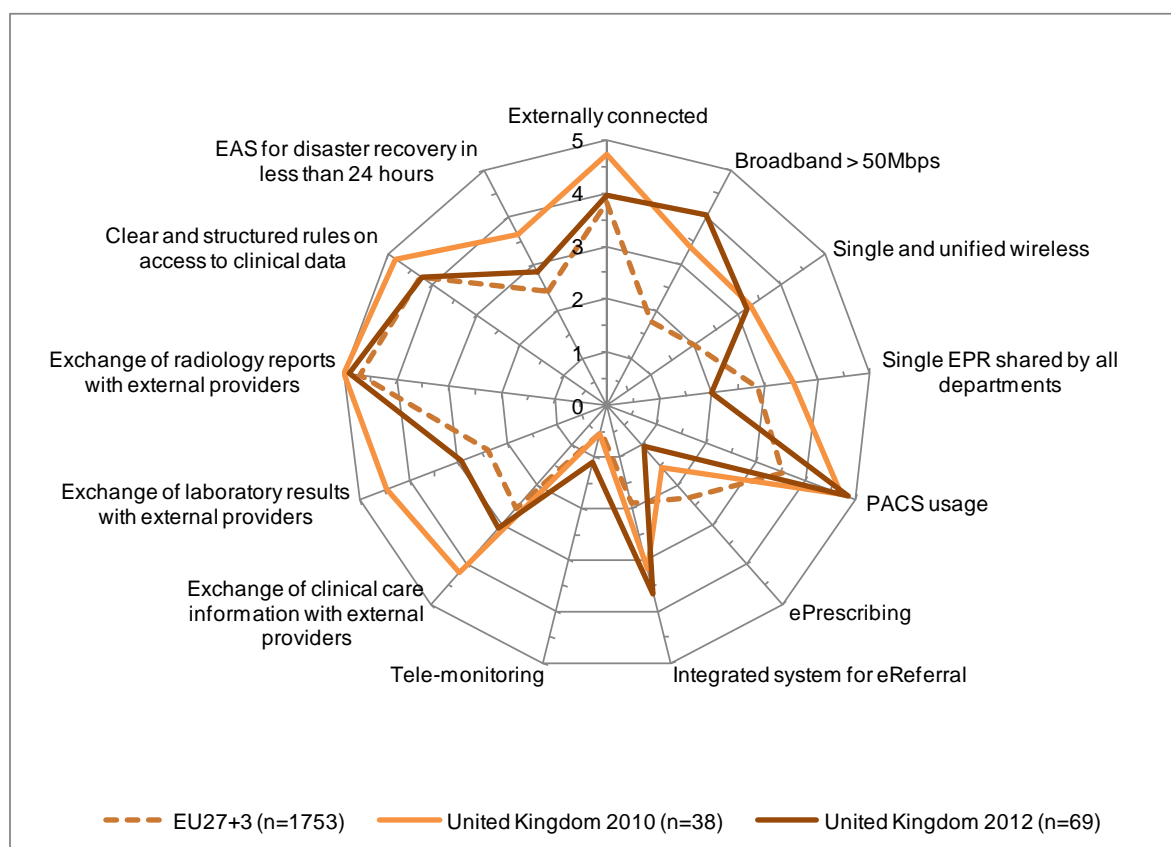
eHealth indicators - United Kingdom	Score difference, national 2012 vs. EU27+3	Score difference, national 2012 vs. national 2010
Externally connected	3%	-15%
Broadband > 50Mbps	46%	13%
Single and unified wireless	24%	-2%
Single EPR shared by all departments	-17%	-31%
PACS usage	26%	2%
ePrescribing	-26%	-11%
Integrated system for eReferral	35%	10%
Tele-monitoring	12%	11%
Exchange of clinical care information with external providers	10%	-23%
Exchange of laboratory results with external providers	11%	-30%
Exchange of radiology reports with external providers	4%	-2%
Clear and structured rules on access to clinical data	0%	-13%
EAS for disaster recovery in less than 24 hours	9%	-16%

Note: Results are based on valid answers only - bases (n) may differ from the ones reported here. The scoring scale from 0 to 5 points corresponds to an implementation rate from 0% to 100%.

Position of the United Kingdom's eHealth profile in EU27+3

442 The United Kingdom is comfortably above the average in terms of the adoption of eHealth capabilities. The United Kingdom's largest scores above the average value come from "*Broadband > 50Mbps*" (46%), "*Single and unified wireless*" (24%), "*PACS usage*" (26%) and "*Integrated system for eReferral*" (35%). Only the *"Single EPR shared by all departments", "ePrescribing"* and *"Clear and structured rules on access to clinical data"* indicators scored below average, with -31%, -11% and -13% respectively.

Change in the United Kingdom eHealth profile

443 Despite the United Kingdom's healthy position in relation to global eHealth values, the country's performance has unfortunately dropped in several areas. Since then, only four areas have posted growth. All other nine indicators registered negative growth, with "*Single EPR shared by all departments*", "*Exchange of clinical care information with external providers*" and "*Exchange of laboratory results with external providers*" with a change of -31, -23 and -30 percentage points respectively.

Figure 170: United Kingdom acute hospitals eHealth profile by ownership
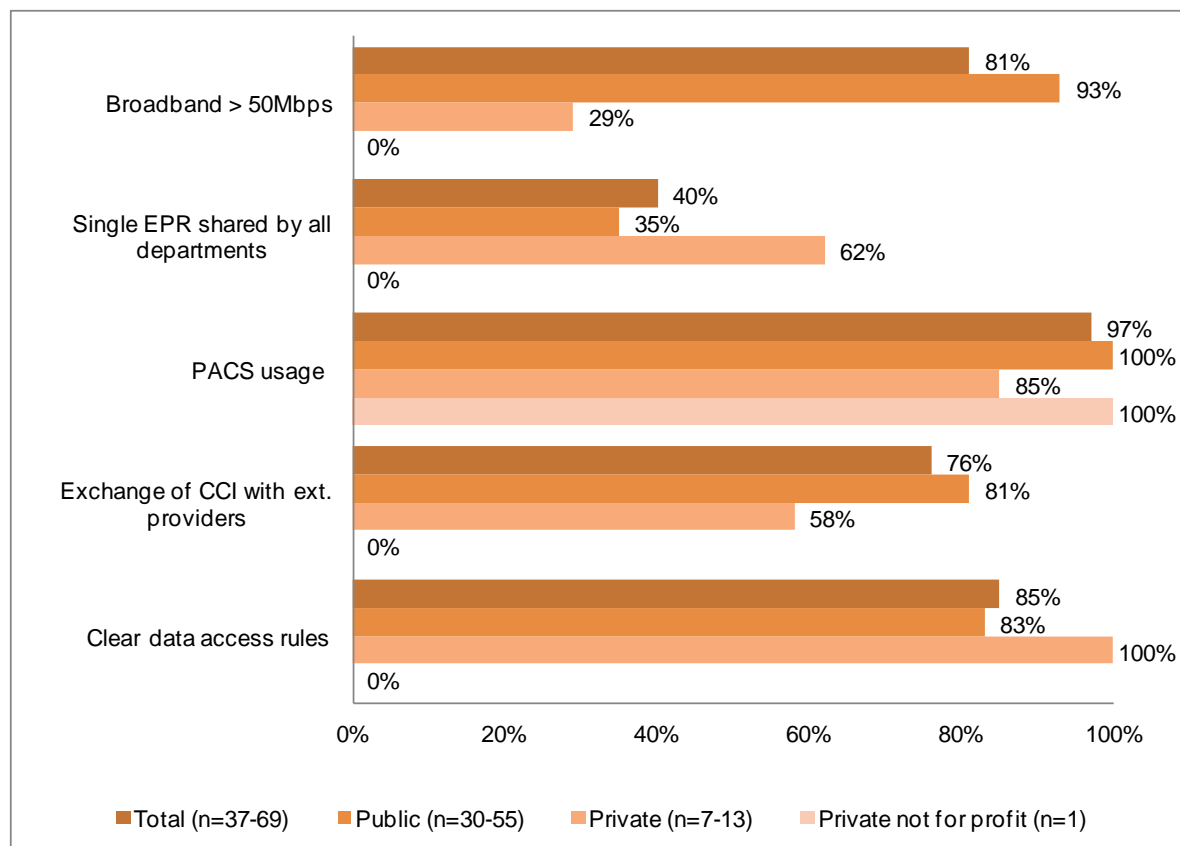
Note: Results are based on valid answers only - category bases may vary from the total reported here.

444 In the United Kingdom, Private not for profit acute hospitals only returned data for one of five categories under investigation; however data for Public and Private hospitals is available for all five categories. While Public hospitals appear to perform better, scoring highest or joint highest in three of five categories ("*Broadband > 50Mbps*", "*PACS usage*" and "*Exchange of clinical care information with external providers*"), Private hospitals perform better in "*Clear and structured rules on access to clinical data*" and "*Single EPR shared by all departments*". Overall, no definite trends can be observed based on ownership type.

Figure 171: United Kingdom acute hospitals eHealth profile by size
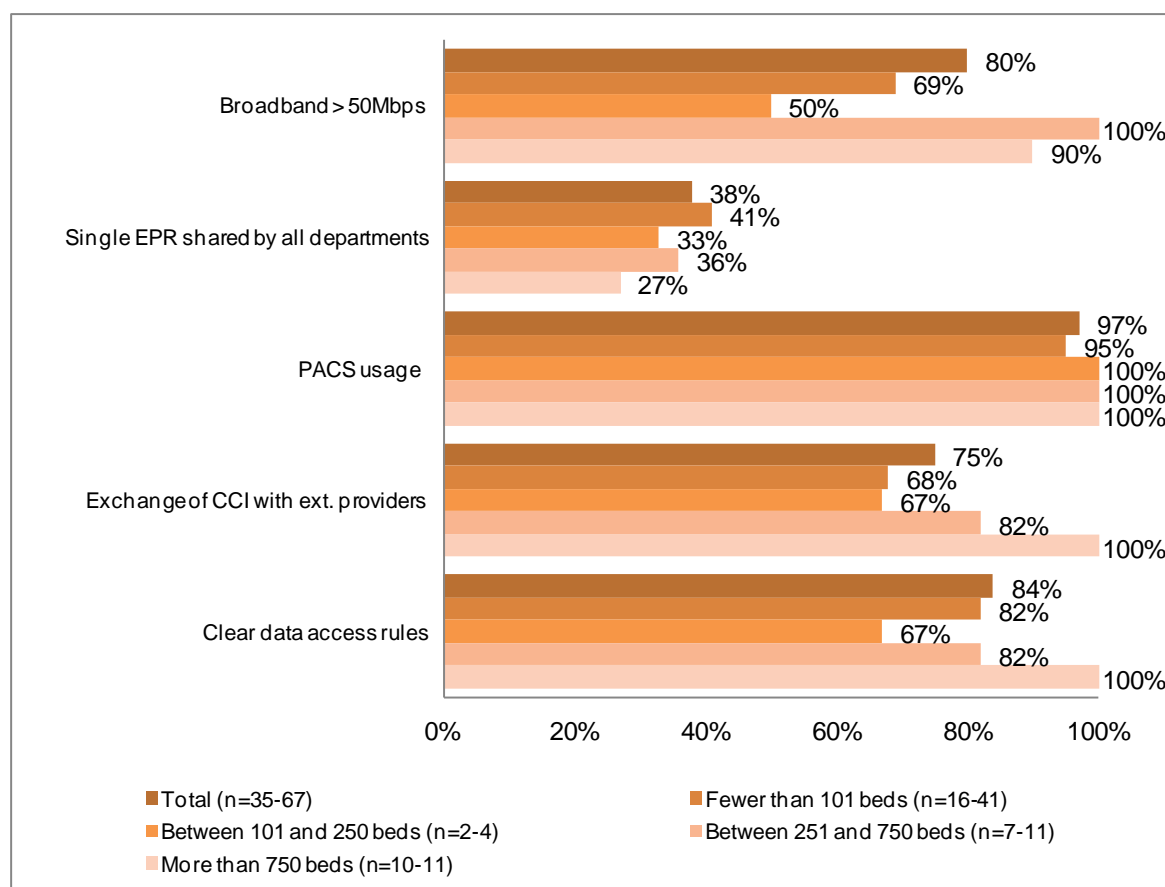
Note: *Results are based on valid answers only - category bases may vary from the total reported here.*

445 Scale appears to be more influential in the development of eHealth capabilities across UK hospitals, with the largest hospitals (Between 251 and 750 beds and More than 750 beds) outperforming other segments in four of five indicator areas. In addition, for three of these indicator, "*Broadband > 50Mbps*", "*Exchange of clinical care information with external providers*" and "*Clear and structured rules on access to clinical data*", the margin between the highest and lowest performers is considerable (between 33% and 50%).

Figure 172: Difference between NUTS 1 level and country-level results

	Broadband > 50Mbps	Single EPR shared by all departments	PACS usage	Exchange of clinical care information with external providers	Clear and structured rules on access to clinical data
Total United Kingdom (n=69)	43%	39%	97%	74%	81%
UK - ENGLAND (n=26)	62%	46%	100%	85%	92%
UKL - WALES (n=5)	-	100%**	80%	60%	80%
UKM - SCOTLAND (n=35)	37%	26%	97%	69%	74%
UKN - NORTHERN IRELAND	33%	33%	100%	67%	67%

Note: *UK – England combines the UKD - North West (England), UKE - Yorkshire And The Humber, UKF - East Midlands (England), UKH - East Of England, UKI – London, UKJ - South East (England), UKK - South West (England) NUTS 1 regions*
Results are based on valid answers only - bases may vary from the total observations reported here
* Statistically significant difference between the region and the national level at the 95% confidence interval

446 The most prevalent eHealth capabilities as displayed by United Kingdom NUTS 1 data are "*PACS usage*" and "*Clear and structured rules on access to clinical data*", which are at 97% and 81% penetration levels based on total United Kingdom figures. Furthermore, "*Single EPR shared by all departments*" is present at 100% in *UKL – Wales*: this value is statistically significantly different at a 99% confidence interval compared to the national results.

6 Conclusions and recommendations

6.1 Comparison with other studies and surveys

6.1.1 Studies used for comparison

447 The results of this survey are intended to build upon the results of previous studies which were conducted in the same field. Therefore we will make a comparison with some of the salient surveys and studies on eHealth deployment which have been carried out over the past decade. In order to fit with the chronological evolution of the results, we will focus our comparison on the most recent benchmarking study in this field (by Deloitte/Ipsos in 2010). Other benchmark studies will also be taken into consideration in order to develop the final picture on the deployment of eHealth in EU27+3.

448 The main reference studies used in this chapter are as follows (in order of relevance):

- Deloitte and Ipsos, "eHealth Benchmarking III SMART 2009/0022 (2011)";
- JRC-IPTS, C. Codagnone, F Lupianez-Villanueva "A composite Index for the Benchmarking of eHealth Deployment in European Acute Hospitals. Distilling reality into a manageable form for evidence-based policy" (2011);
- E-Business Watch, the European Commission "ICT and e-Business in Hospital Activities: ICT adoption and e-business activity in 2006" (2006);
- Hospital Information Network Europe (HINE) "European Hospital Market Metrics -2004" (2004);
- Empirica "Benchmarking ICT use among General Practitioners in Europe" (2008).

6.1.2 Comparison in detail

6.1.2.1 Deloitte and Ipsos, "eHealth Benchmarking III SMART 2009/0022 (2011)"

449 The Benchmarking III study was the most closely aligned to the present work. The objective of our study was to build directly on the 2010 survey, and in turn update and widen the scope of the analysis provided at that time.

450 The previous benchmarking study found sound progress in eHealth, with high percentages of hospitals connected to broadband (92%) but with half of them having a bandwidth of below 50Mbps (52%). Benchmarking III reported that there was still room for improvement when it came to next-generation broadband (>100Mbps) and that such high bandwidth could prove useful in advancing digital imaging and telemonitoring. We concur with this assumption; however we believe that it will take some time for next-generation broadband to be rolled out to the market, but that the take-up will be inevitable once it becomes widely available.

451 Another point of interest to our study is that electronic patient record systems and PACSs are less accessible from outside the hospitals by external healthcare providers (24% for electronic patient record systems and 27% for PACS) or by patients, meaning that hospitals still act (understandably so) as 'data silos' in many regards. This point was reinforced by figures from the Benchmarking III study which stated that electronic medical data exchanges outside acute hospitals with other providers were still not common in European acute hospitals. Three instances are immediately evident: 54% of acute hospitals did not have electronic exchange of clinical care information, 57% did not exchange laboratory results and 75% did not exchange medication lists with external providers.

These results have improved noticeably in our study, with a lower number of acute hospitals (43%) now stating that they have no electronic exchange. Similarly, only 47% of acute hospitals now refrain from exchanging laboratory results, while only 70% do not exchange medication lists with external providers.

6.1.2.2 JRC-IPTS, composite index for eHealth benchmarking, study (2011)

452 The JRC-IPTS Report is not a survey as such, but a multivariate statistical analysis run on a composite index (CI) on eHealth deployment in European hospitals. This report was built using the eHealth Benchmarking III data, and therefore offers further interesting analysis on those results.

453 Using multivariate statistical methods, the study's aim was to apply a selective but deep vertical focus to the results of the Benchmarking III study with the objectives of a) providing more meaning to the results by constructing a composite index; and b) extracting key policy messages. To this end, the report constructed a composite index of eHealth deployment with a view to proposing a roadmap towards systematised and replicable benchmarking.

454 Amongst the findings of the study were the following:

- Connectivity was quite high in most countries (more than 80% connected through Extranet or Internet);
- Electronic exchange of information lagged behind fairly generally (across countries);
- Electronic exchanges were still limited among the potential interacting players and cross-border exchanges were extremely limited.

455 All these characteristics have been noted in our own study:

- High levels of broadband infrastructure (88% broadband connectivity – all speeds, excluding 9% expressing a 'don't know' response), 3% narrowband and 0% without any connectivity;
- Much lower levels of electronic information exchange:
  - A maximum of 39% for exchanges with external hospitals;
  - Almost no cross-border data exchange, whether in the EU or beyond (typically in the low single-figure percentages at eu level, although smaller countries such as Cyprus and Iceland tend to engage in more activity in this area).

456 The Composite Index study also noted the wide variation across countries, an aspect which is also quite clear from our results. In particular, the lowest deployment measured by the composite index concentrated mostly among the new Member States and candidate countries. Of the bottom 13 countries identified, 12 were from this group with Greece as the exception. The only new Member State that scored above the EU27 average was Estonia. Consequently, the report called for awareness-raising policies and possibly financial support targeting this group of countries.

6.1.2.3 E-Business Watch, the European Commission "ICT and e-Business in Hospital Activities: ICT adoption and e-business activity in 2006" (2006)

457 The e-BusinessWatch survey of 2006, which was the fourth survey after those of 2002, 2003 and 2005, had a scope of 14,081 telephone interviews with decision-makers in enterprises from 29 countries, including the 25 EU Member States, EEA and Acceding / Candidate Countries of that period. Similarly to our study, the interviews were carried out using computer-aided telephone interview (CATI) technology in March and April 2006.

458 Several interesting aspects which we believe are significant were raised in the 2006 E-Business Watch survey. This involved size class differences, and standards of interoperability.

1. According to the survey results at the time, and which we also found, small hospitals generally lagged behind medium-sized and large ones in ICT and e-business use. This applied, for example, to internet, broadband and remote network access as well as for internal and external e-collaboration. Equipment with broadband access was reported to be similar in medium-sized (84%) and large hospitals (86%), while small hospitals appeared to lag behind (64%). Large hospitals had a reported lead in remote access (41%), medium-sized hospitals (34%) and small ones (38%) followed behind. However, small hospitals reported higher shares of employees that have internet access and internet telephony use as well as for online service booking, indicating that smaller hospitals could also use ICT to their advantage.

2. Standards and interoperability issues were also highlighted. At the time, certain standards for the healthcare sector were already in use, including TC 251, Health Level 7 (HL7), Digital Image and Communications in Medicine (DICOM), and the specifications developed by Integrating the Healthcare Enterprise (IHE). It was noted that 'Commitment to European and international standards is generally weak, and there is a tendency for Member States to create national ICT standards for the health sector'. Only 26% of the hospitals of the survey said they used HL7 standard. Even more interesting was that in four of seven categories asked in the 2006 survey, the share of hospitals reporting difficulties due to a lack of interoperability was larger for invoicing, payments, technical aspects and regulatory aspects than in other industry sectors[76]. This suggests greater inherent complexity within Healthcare as an industry by contrast to other economic sectors.

6.1.2.4   Hospital Information Network Europe (HINE) "European Hospital Market Metrics –2004" (2004)

459   The HINE Report is a series of country-level surveys of 900 mainly large hospitals in 14 countries. Due to the external support provided by nine leading external commercial organisations, the Report Series focussed more on business-related issues such as current expenditures, the timing of investments and the factors influencing IT spending.

460   As mentioned above, as the HINE study was based on larger hospitals, the percentage values for penetration of eHealth capabilities was more than likely overstated (we have seen how larger hospitals tend to develop and use eHealth capabilities more so than their smaller counterparts). In addition to this, the HINE data displayed does not include Eastern European countries, and therefore results are derived from the wealthier EU states, which would, again, overstate the penetration of capabilities. This makes some of the results even more impressive when contrasting our results with the comparable data. For example, PACS use has increased from 32.4% to 70%, Electronic Patient Records (there is no distinction between EMRs, EHRs and EPRs in the HINE study) have increased from 51% to 81%, while ePrescribing jumped from 8.6% to 43%.

6.1.2.5   Empirica "Benchmarking ICT use among General Practitioners in Europe" (2008)

461   The study from Empirica is more recent has been included in this section in order make a comparison with the situation of eHealth in other healthcare environments. The survey was carried out in all 27 Member States of the European Union and in Norway and Iceland in late 2007 and was also reliant on Computer-Aided Telephone Interviewing with some exceptions. The universe consisted of all General Practitioners (GPs) in the respective countries and 6,789 interviews were achieved. From a methodological point of view, a comparison with the present works well based on the fact that the type of question, the terminology and the geographical coverage match to a certain extent.

462   While it is clear that the GP working environment differs widely from that of acute hospitals, some valuable messages in relation to the broader eHealth context, as well as specifically relevant to our study, can be derived from the GP ICT study.

463   Although GP technology requirements are less complex than those required by acute hospitals, we note in particular

- Electronic connections with other health actors;
- Electronic exchange of patient data; and
- Electronic interactions with patients.

464   The study found that the Internet as well as other dedicated types of electronic networks allowed GP practices to establish connections to other health actors' electronic systems, such as those of laboratories, other GP practices, secondary health actors such as specialists and hospitals, health authorities, insurance companies, pharmacies, patients' homes and care homes. While these latter uses were not extensive, they display the ability for the medical profession to interlink data across geographical divides.

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[76]   The sectors covered were Food and beverages, Footwear, Pulp, paper and paper products, ICT manufacturing, Consumer electronics, Shipbuilding and repair, Construction, Tourism, Telecommunication services, Hospital activities.

465   As an example, administrative patient data were stored electronically in 80% of the EU27 GP practices, with practice size playing a certain role in this regard (an average difference of 11 percentage points between the smallest and the largest size class, with the larger practices being better equipped approximately at 74% for single GPs versus 85% for multiple GPs). This included patient data stored for medical purposes, data on diagnoses and medications, administrative patient data, basic medical parameters, laboratory results, a patient's symptoms or the reasons for his/her visit, medical history of a patient, ordered examinations and their results all scored in excess of 80%. In addition to this, 76% of all practices stored individual patient data in a structured manner, which facilitates the automatic processing of the data in other electronic systems. By contrast, our study found that 71% of acute hospitals have EMR/EHR/EPR availability, displaying similar levels of digitisation (even if the complexity and volume differs tremendously between each).

466   Both of these findings have important implications for the development of pan-European medical data sharing, as it displays a pervasive and increasing level of digitisation across the healthcare market, regardless of level or location. However, the major challenge – one of convergence of standards and frameworks (whether legal, ethical or technical) – remains to be solved.

6.1.3   Summary of the findings

467   Looking across the studies, we noted a number of points:

1. The **Broadband connection speed has not improved** since 2010 and the majority (56%) of hospitals still have a bandwidth of below 50 Mbps. This is true at European level and in terms of persisting differences between countries (Nordic countries perform better). Wireless unified infrastructures on the contrary have advanced since 2010, passing from 54% to 66%. However, single wireless infrastructures still need to be developed, as they currently stand at 39%

2. **eHealth has the capacity to develop quite unevenly**. The use of EPR (there was no distinction used regarding EHR and EMR in the eHealth Benchmarking III study) has not improved since 2010, while PACS usage has increased from 2010, passing from 61% to 70%. Interestingly, the AHA survey of 2011 on the American hospitals eHealth[77] situation displayed the existence of a trade-off between accomplishments on specific objectives on the one hand, and having a fully certified EHR technology for hospitals involved in the Medicare and Medicaid incentives programs for hospitals on the other hand ("meaningful users" of certified EHR).

   This is relevant when considering incentive programs for hospitals, and how they should be best targeted.

3. The **lack of information sharing with patients** is regularly cited in many studies. This is a complex area as it touches on privacy requirements, legal requirements and security issues as well as the more obvious structural and infrastructural problems. The vast majority of hospitals (90% today vs. 96% in 2010) still do not provide external access to their electronic patient records. Secure online access to clinical data for patients is likely to remain a high-profile issue.

4. Regarding **exchange of clinical care information, radiology reports and medication lists**, the general picture **has improved only slightly**. In 2010 the majority of information was still exchanged within the hospital or with other hospitals, but less with other types of providers such as General Practitioners and specialists. The non-implementation of telemonitoring of outpatients, by contrast, has gone from 89% non-implementation to 76% non-implementation between 2010 and 2012.

5. Our survey highlights a 'hybrid hump', wherein **41% of hospitals** occupy a **mid-way** point **between** a fully **paper-based** non-digitised environment **and** an **electronic** paperless environment.

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[77]   AHA (2011), 'AHA Survey on Hospitals' Ability to Meet Meaningful Use Requirements of the Medicare and Medicaid Electronic Health Records Incentive Programs', American Health Association, http://www.aha.org/content/11/11EHRsurveyresults.pdf.

6. **Our survey confirms the findings of multiple other studies** (Deloitte, e-BusinessWatch and Empirica) in relation to conclusions drawn on the subject of interoperability. Interoperability problems are still one of the most important barriers to be tackled in order to promote the integration of data systems at all levels of the healthcare chain, including within and between hospitals, as well as with other healthcare providers (GPs, laboratories, etc.)

7. The GP ICT use study of 2008 demonstrates that **eHealth continues to develop in other areas** outside of acute hospitals. General Practitioners' performance in terms of computer use, transfer of patient data and electronic data exchange has increased significantly between 2002 and 2008.

6.2 Study Conclusions

6.2.1 Larger and public hospitals are at the forefront

468 Larger and public hospitals have clear advantages in relation to the development, take-up and roll-out of eHealth capabilities. This is no surprise as such institutions have a larger economies of scale, greater in-house expertise in terms of vital eHealth skill sets (larger IT departments and dedicated staff, project managers, staff with more exposure to eHealth concepts, practices and solutions, etc.) as well as more resources, including incentives to develop eHealth (both public and larger hospitals tend to receive more incentives relating to IT systems than private and smaller hospitals). Larger hospitals (as well as public hospitals) are also generally better-equipped than private establishments and small and medium-sized hospitals with respect to the type of internet connection they use.

469 In addition to this, the quality of eHealth functions also appears to be greater than in smaller hospitals. The largest hospitals seem to ensure better data protection than small and medium-sized hospitals, and they are more likely to use EMR/EHR/EPR and tend to share this information more readily. A similar effect can be observed in relation to hospital size and PACS usage. The bigger the establishments are, the more they rely on PACS. In fact, there is a very clear positive correlation between hospital size and the extent to which hospitals electronically exchange information about patients, whatever the type of information.

470 Overall, these characteristics combine to make larger hospitals eHealth hubs that are able to develop and roll-out eHealth practices and solutions more quickly, as well as lead in terms of reliance on and quality of eHealth capabilities.

6.2.2 Definite country differences are in place

471 Nordic countries appear to be the overall leaders in eHealth across the EU27+3, with consistent leadership across a range of eHealth indicators. Hospitals situated in Nordic countries (as well as large hospitals and public hospitals) are most likely to encounter interoperability problems – which may be due to a wider investment in different eHealth assets, and thus a higher exposure to problems in integration and interoperability. This is reinforced by the fact that most of the Nordic countries

- Are the most advanced in terms of implementation of IT systems or applications;
- Are more advanced in video conferencing; and also
- Devote a generally higher part of their budget to IT than other countries.

472 Conversely, the lesser performing regions are within Eastern and Southern Europe. Countries lagging behind in the implementation of a wireless infrastructure in their hospitals are located in Eastern, Southern and Central Europe, while those where this is most developed are the countries of Northern and Western Europe. Eastern countries also have a higher proportion of hospitals having a narrowband connection. Furthermore, hospitals in Eastern European countries tend to lag behind regarding the interconnectivity of their computer systems. However, while the relative wealth and capacity to invest may broadly explain these differences, the conclusions are not necessarily so clear cut. One question raised is that, if it were simply a matter of relative wealth, then why do many of the larger and wealthier EU states fail to perform as well as the Nordic countries? The answer may lie in the sheer scale of their healthcare sector, making change difficult and relatively slow to implement, but this may also have cultural, social and political underpinnings. Also, many Central European states and other post-soviet states also performed well in certain indicators. For example, while Nordic countries tend to lead in the electronic exchange of medication lists information with other healthcare providers, other leaders in this field include Croatia, the Czech Republic, Estonia and Latvia. Both the Nordic and Baltic countries are also forerunners in HIE, with high levels of implementation and usage.

6.2.3 *eHealth can be slow to develop, but is quickly relied upon once in place*

473 While the impediments to eHealth take-up by institutions can be easily imagined (capital investment, difficulty of introducing change to a complex environment, process reorganisation (accompanied by potential labour reorganisation and labour relations challenges), technical sophistication and multiple stakeholders), the user acceptance of eHealth appears to be quite high.

474 Overall, Hospitals having eHealth functionalities available mostly use them routinely, and this is important in terms of charting not just the take-up of eHealth capabilities, but also the ultimate utility.

475 Telehealth is a good example of this trend. According to our data:

- Telehealth is only implemented to a minor extent and is mostly available for holding consultations with other healthcare practitioners (31%);
- Telehealth with patients is not very common (implemented in less than 12% of the surveyed hospitals on average).

476 However, when telehealth capabilities are implemented, they are mostly used (usage in around 90% of the surveyed hospitals on average).

477 This demonstrates that the capability offers genuine utility for healthcare professionals.

6.2.4 *Gaps in terms of data security, data access and IT planning could easily be closed*

478 We noted the following details in relation to governance of data, patient access to electronic medical data as well as IT planning:

- 85% of hospitals surveyed have clear rules for accessing patients' electronic medical data;
- More than 90% of hospitals surveyed have regulations to guarantee the privacy and security of data, either at national (58%), regional (27%) or hospital level (66%);
- Only a small majority (57%) of the surveyed European hospitals have an IT strategic plan, as opposed to 40% of hospitals who do not have one.

479   In relation to data access, data security and data privacy, clear rules applying at all hospital levels should be mandatory. Therefore, despite seemingly high percentage levels (between 85%-90%), the incidence should in fact be much higher. Data governance – as expressed in guidelines, rules and procedures – is not difficult to implement and is typically derived from well-known legislative instruments (e.g. European Directives) or best practice guidelines (such as ITIL[78]). Translating the various requirements into a single working document does not require much investment, and should in fact be universal for all healthcare providers in any jurisdiction. Closing the gap in relation to data governance should thus be one of the simplest challenges to overcome within the entire sector.

480   Similarly, the study found that the surveyed hospitals seldom implement a coherent IT strategic plan, despite the relatively low cost of introducing such a document. While it is understood that smaller hospitals with less IT investment may not have a use for such a plan, the relatively low penetration of IT strategic plans in European hospitals suggests an environment where eHealth itself is not formally recognised as a strategic necessity at hospital level. Nor do such documents have to involve painstaking levels of detail. As stated previously in our study, an IT strategic plan includes a mission and a vision statement, objectives for the IT department, an assessment of the needs and requirements (in terms of infrastructure, staff, technologies, etc.), a description of the current and future projects intended to satisfy those needs, a budget and a method for a follow-up evaluation. The level of granularity invested in these details is entirely up to the judgment of senior hospital staff. Therefore, the implementation of an IT strategic plan should be much more prevalent at all levels.

6.3   Recommendations

6.3.1   Survey recommendations

481   Our study has been conducted using largely the same methodology as the 2010 Benchmarking III project and this has guaranteed the comparability of the data over the years. However, some recommendations can be made in order to improve the quality of responses in future waves of this study. These recommendations can be grouped in two main areas:

     1.   The scope of the study

     2.   The methodology used and the target population

6.3.1.1   The scope of the study

482   For this edition of the survey, 7 main topics (referred to as 'Blocks') were covered during the interviews with the respondents. These were:

- Block A. Characterisation of the hospital;
- Block B. ICT infrastructure;
- Block C. ICT applications;
- Block D. Health Information Exchange;
- Block E. Security and privacy;
- Block F. IT functionalities;
- Block G. Hospital statistics.

483   Block F was a new section on IT functionalities which was not featured in the previous 2010 survey. This had the practical effect of substantially lengthening the interview with respondents. We estimate that interview duration hence increased by 13 minutes in comparison to the previous interview duration of 30 minutes, on account of the addition of this new block.

484   The objective of this new block was to analyse the degree of availability as well as the usage of different types of health information and eHealth functionalities within each hospital. In this, the study has been

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[78]   ITIL (IT Infrastructure Library) is the most widely accepted approach to IT service management in the world. ITIL provides a cohesive set of best practices, drawn from the public and private sectors internationally. Source: http://www.itil-officialsite.com/, accessed 16 May 2013.

successful in terms of gathering a critical mass of new data. We believe that new indicators could be also generated from this block and that these functionality indicators would complement the 13 indicators which are already included on our spider charts for the country reports.

485 Block G was composed of a number of quantitative survey elements, such as the average length of stay in the hospital per year (see Appendix 3 for more details). Many CIOs however did not have the data at hand and were rather unwilling or unable to provide the answers. If needed for future surveys, this data should either be gathered be desk research or by targeting other roles in the respective hospitals.

486 The drawback of the enlargement of the survey was that it had a noticeable effect on the fatigue levels of respondents, who were "tired" when arriving to the end of the questionnaire and this may have had an impact on the quality of their answers. We attempted to mitigate this by bringing priority questions closer to the beginning of the questionnaire. Thus, we would recommend shortening the questionnaire in future studies in order to maintain a higher quality of responses. As a general rule, new questions should only be inserted if older questions are being taken out in order to maintain survey lengths at a more 'respondent-friendly' duration.

487 With regard to the scope of the survey, we believe it would be interesting to explore the barriers to eHealth usage. In fact, this survey mainly gathers information on the access and penetration of eHealth services but does not examine the reasons for eHealth not being implemented in the first place. For example, should a respondent give a negative reply to a question asking whether a certain eHealth solution is in place, follow up questions could ask: 1) whether the eHealth capability was considered and rejected, and 2) if considered, what was the main reason for the rejection? It should be noted that these additional questions should be applied sparingly so that the questionnaire is not expanded excessively, and potentially only to particular eHealth capabilities which have displayed disappointing take up in the past. The choice of such capabilities should be an item for discussion at the inception phase of the next benchmarking study.

6.3.1.2   The methodology used and target population

488 We believe the defined target population of the study was relevant to this study and that only highly skilled ICT profiles would have been able to answer this type of questionnaire. However, due to the busy schedule of such managerial posts, we believe that online surveys, rather than CATI survey, could be considered for longer questionnaires, combined with follow-up reminder e-mails and phone calls. The respondents would have the benefit of being able to complete the questionnaire when most convenient and at different moments (during time-periods that are less busy), making completion of the questionnaire more convenient for them. This methodology could also increase the response rate and could potentially decrease survey costs. It may also allow for respondents to introduce data in open questions which they would not necessarily have to hand at a specific point in time (e.g. budgetary data) and that they need time to reference.

489 As most (91%) European hospitals have internet access (88% have access to broadband), it would be appropriate to use such a methodology and would enhance data comparability in relation to previous survey results. This methodology could be particularly beneficial in countries such as Italy and Germany, where we encountered more difficulties in reaching the minimum sample size requested.

490 The number of completed interviews has been significantly increased (from 906 to 1753) compared to the 2010 study, especially in small countries where the representativeness of the sample has improved. However, in order to be able to expand the analysis at a regional/sub-regional (NUTS 1/NUTS 2) level, it would be important to achieve a more precise sample; therefore, hard or soft quotas could be applied at geographical level. This would be very useful in reaching a minimum sample within each NUTS 1/NUTS 2 region so as to enable data analysis at NUTS level in most of the countries.

6.3.2   Policy Recommendations

6.3.2.1   Benefit from the advantages of larger hospitals

491   As the statistics have demonstrated, larger hospitals have clear advantages in their use and deployment of eHealth capabilities. They are more likely to introduce and make use of eHealth capabilities, as well as to exchange data electronically, regardless of the data involved. In the previous eHealth benchmarking study[79], the authors noted in their conclusions the need to promote the concept of building relationships between small, non-university hospitals and large, research-oriented or university hospitals.

492   We concur with this idea, but suggest examining how this can be leveraged in a more practical way, particularly with respect to eHealth infrastructure and assets. For example, we believe it may be worth investigating the possibility of assigning national 'centre of excellence' status to larger hospitals with advanced eHealth capabilities and assign incentives for these hospitals to improve upon and develop eHealth further – particularly when these eHealth capabilities can be extended to other hospitals.

493   This could take the form of larger hospitals acting as shared services centres within a defined region and responsible for hosting large databases (e.g. patient data) in order to avoid duplication of costly infrastructure, rationalise maintenance costs and simultaneously extend the benefits of eHealth to smaller hospitals.

494   There are clear obstacles to such an approach, in particular bandwidth. Indeed, adequate bandwidth is essential to transfer large medical documents efficiently (particularly medical imagery). This does not mean that current levels of bandwidth are inadequate, but it may rule out interactions with hospitals lacking a minimum level of connectivity (for example, hospitals still operating with dial-up facilities are unlikely to be able to benefit much). Other obstacles involve investments on resolving interoperability issues – which persist even within hospitals, let alone between them (see below).

495   However, by suggesting a hospital-centric approach focused on national eHealth champions, Member States may be able to concentrate on consolidating their current eHealth assets and creating a more robust eHealth base across multiple regions. A combination of grants and low or no interest rate loans could be made available for those eHealth systems which have a proven track record in cutting overall hospital budgets or increasing overall efficiency. This could be used in particular to develop Centre of Excellence Hospitals and potentially shared services solutions. Furthermore, knowledge transfer is vital to spread the expertise and benefits of eHealth systems across the EU, in particular from advanced countries to less advanced countries. Exchange programs should be sponsored for administrators, IT staff and senior healthcare professionals to expose each participant to the varying challenges, solutions and implementation methodologies available on the market.

6.3.2.2   Accelerate efforts to overcome interoperability issues

496   The concepts of interoperability and electronically exchangeable patient data were already noted in the 2004 Action Plan[80], the 2006 Report of Unit ICT for Health in collaboration with the i2010 sub-group on eHealth[81] and the 2008 Recommendation on interoperability[82], amongst others. Interoperability was also raised in the 2010 benchmarking study[83] as an ongoing issue, and cited in the 2011 Cross-border Healthcare directive[84], which stated that 'widely different and incompatible formats and standards are used for provision of healthcare using ICTs throughout the Union, creating both obstacles to this mode of cross-border healthcare provision and possible risks to health protection'. Interoperability remains a clear issue of concern based on our observations within this study.

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[79]   Deloitte & Ipsos, (2011), op. Cit.
[80]   European Commission, COM (2004) 356, op. Cit
[81]   European Commission (2006), op. Cit.
[82]   European Commission, COM(2008)3282, op. Cit.
[83]   Deloitte & Ipsos (2011), op. Cit.
[84]   European Parliament, DIRECTIVE 2011/24/EU, op. Cit.

497   Consider this statement made by the International Telecom Union's Standardisation Sector (ITU-T)[85] in 2012:

Interoperability is not a given in electronic healthcare. Lack of interoperability is one of the greatest threats to achieving the improvements to healthcare and cost efficiency promised by emerging e-health systems. This barrier is not only a technical barrier but a market-driven barrier arising from the economic competition inherently occurring among companies seeking to profit in emerging and extremely lucrative e-health industries, and the lack of incentives among healthcare delivery systems to adopt standards. Unless a critical mass of healthcare technology providers adheres to the same standards for electronic health records, the system will not provide the anticipated cost efficiencies and healthcare quality improvements. The same requirement holds for aggregated public health data and mobile systems. As long as electronic health records are fragmented technically without adequate standardization among providers and vendors, meaningful system federation / public aggregation or remote clinical care will be difficult to achieve.

498   If, as is suggested by the ITU-T[86], the eHealth standards landscape is institutionally heterogeneous, it may be justified to examine the eHealth industry and consider whether the ongoing interoperability issues constitute a market failure. Unless a critical mass of healthcare technology providers adheres to the same standards for electronic health records, the system will not provide the anticipated cost efficiencies and healthcare quality improvements. Technical improvements may foster the uptake of interoperability standards but they cannot by themselves solve the problem if not accompanied by the appropriate legal and regulatory frameworks, and more specifically incentives (see also below). Nevertheless, the Commission is currently actively engaged in reducing interoperability issues on many levels, including the European Patients Smart Open Services project (epSOS, to end in December 2013), the thematic network on eHealth Interoperability (CALLIOPE), and the Healthcare Interoperability Testing and Conformance Harmonisation (HITCH, launched in January 2010). Deliverables from the various efforts should be evident from 2014 onwards, and will hopefully be reflected in the corresponding benchmark study for that period. However, based on the long duration of interoperability issues with the eHealth sector, it may be time for the EU to consider bolder action in relation to interoperability issues if no substantive progress is evident by that time.

6.3.2.3   Close the governance gaps - Data security, privacy, access and hospital ICT strategy planning

499   The Commission is currently working on a root-and-branch review of the EU's data protection rules, and therefore has a golden opportunity to create a regime which will be conducive to eHealth capability development. Therefore, it is to be hoped that the ultimate output of this review will address the high-level concerns in relation to data exchange, privacy and access. The 2011 Cross-border Healthcare directive[87] went a long way to establish the citizen's rights in relation to their health records, as well as establishing the eHealth network which is involved in many of the interoperability areas discussed above. This development should produce a functioning regulatory and technical environment which is conducive to a much greater development and roll-out of eHealth capabilities.

500   However, at the hospital level there must be a concentrated push to close all current gaps in security, guaranteeing the privacy and security of data and accessing patients' electronic medical data. By contrast to infrastructure and ICT investment, this is a relatively low cost area which can be addressed by Member States (with whom the responsibility lies to implement the provisions of the Cross-border healthcare directive for example) simply by enforcing the requirements of the Directive.

501   Similarly, the current low levels of strategy planning need to be improved, and all hospitals should either have an ICT strategy plan of their own, or at least be incorporated under regional and/or national ICT strategy plans if the hospital is below a certain threshold in terms of IT staffing, budgets, etc.

502   Promotion of specific Healthcare ICT governance, covering eHealth as a major component, derived from existing best practices in both the healthcare sector and the ICT industry, could assist in the improvement of this area and closure of the governance gap.

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[85]   ITU (2012), E-health Standards and Interoperability, ITU-T Technology Watch Report, April 2012, ITU.
[86]   Ibidem.
[87]   European Parliament, DIRECTIVE 2011/24/EU, op. Cit.

7 Apppendix

7.1 Appendix 1: Abbreviations and acronyms

Abbreviations/acronyms	Meaning
AHA	American Hospital Association
ANSI	American National Standards Institute
CAT scanner	Computed Axial Tomography scanner
CATI	Computer-Assisted Telephone Interviewing
CDC	Centre of Disease Control
CENELEC	European Committee for Electrotechnical Standardisation
CIO	Chief Information Officer
CNO	European Committee for Standardisation
COO	Chief operational officer
CVIS	Cardiology and Visualisation Information System
DG INFSO	Directorate-General for Information Society and Media
DICOM	Digital Imaging and Communication in Medicine
EAS	Enterprise Archiving Strategy
EC	European Commission
EHR	Electronic Health Record
EMR	Electronic Medical Record
EPR	Electronic Patient Record
ETSI	European Telecommunications Standards Institute
EU	European Union
FTE	Full-Time Equivalent
GOe	Global Observatory for eHealth
GP	General Practitioner
HIE	Health Information Exchange
HIS	Healthcare Information System
HL7	Health Level Seven
ICT	Information and Communication Technology
IHE	Integrating the Healthcare Enterprise
IPTS	Institute for Prospective Technology Studies
ISDN	Integrated Services Digital Network
ISO	International Organisation for Standardisation
IT	Information Technology
ITIL	IT Infrastructure library
JRC	Joint Research Centre
Mbps	Megabits per second
MRI	Magnetic Resonance Imaging
NHS	National Health Service
NUTS	Nomenclature of Units for Territorial Statistics
OECD	Organisation for Economic Co-operation and Development
OSI	Open Systems Interconnections
PACS	Picture Archiving and Communication System
PSTN	Public Switched Telephone Network
RIS	Radiology Information System

Appendix 1

Appendix 1: Abbreviations and acronyms

Abbreviations/acronyms	Meaning
TEC	Trans-Atlantic Economic Council
UK	United Kingdom
US	United States
USA	United States of America
WHO	World Health Organisation

7.2 Appendix 2: Glossary of terms and definitions

Adverse Event

503 Any undesirable experience occurring to a patient treated with a pharmaceutical product whether or not considered related to the medicinal product. This includes adverse events occurring in the course of the use of a drug product in professional practice, adverse events occurring from drug overdose, adverse events occurring from drug withdrawal and any failure of expected pharmacologic action.

504 Adverse health events reporting system is an electronic reporting system for reporting adverse health events that take place. These health events could happen at a hospital, department, or ward level and also include the reporting of near misses.

Application

505 A software program or set of related programs that provide some useful healthcare capability or functionality.

Archived document

506 A status in which a document has been stored off-line for long-term access.

Billing management system

507 System that produces automated electronic/paper bills and invoices hospital-wide.

Business intelligence information system

508 Reporting applications and analysis tools including a variety of components such as tabular reports, spreadsheets, charts and dashboards.

Catchment area

509 Number of inhabitants covered by a hospital.

Certification

510 Technical evaluation performed as part of, and in support of, the accreditation process that establishes the extent to which a particular computer system or network design and implementation meet a pre-specified set of security requirements.

Clinical data/information

511 Data/information related to the health and healthcare of an individual collected from or about an individual receiving healthcare services. Includes a caregiver's objective measurement or subjective evaluation of a patient's physical or mental state of health, descriptions of an individual's health history and family health history, diagnostic studies, decision rationale, descriptions of procedures performed, findings, therapeutic interventions, medications prescribed, description of responses to treatment, prognostic statements and descriptions of socio-economic and environmental factors related to the patient's health.

512 A clinical information system is a system that collects, stores, retrieves, and communicates health related data, information and knowledge.

Clinical decision support system

513 Typically used when referring to a type of system that assists health care providers in making medical decisions. These types of systems typically require input of patient-specific clinical variables and as a result provide patient-specific recommendations.

Cryptography

514 The branch of cryptology dealing with the design of algorithms for encryption and decryption, intended to ensure the secrecy and/or authenticity of messages, primarily through the use of mathematical or logical functions that transform intelligible data into seemingly unintelligible data and back again.

515 Encryption is a process by which data are temporarily re-arranged into an unreadable or unintelligible form for confidentiality, transmission, or other security purposes.

Diagnosis

516 Condition for which the patient is seeking care. Types of diagnoses range from early and indefinite to final and definitive. Some examples (in general order of definiteness) include presenting (or chief complaint), presumptive, working, admitting, discharge, dismissal, or final. Applying classification codes to the diagnosis becomes more straightforward as the diagnosis is more established. Early diagnoses may be vague or even expressed in natural language rather than coded.

Digital Imaging and Communications in Medicine (DICOM)

517 Standard in digital imaging. Version 3 of DICOM defines image data as well as patient, study and visit information necessary to provide the context for the images. This version incorporates an object-oriented data model and adds support for ISO Standard communications.

Digital signature

518 Authentication tool that verifies the origin of a message and the identity of the sender and receiver. Can be used to resolve any authentication issues between the sender and receiver. A digital signature (code) is unique for every transaction and guarantees the source and integrity of the message.

Discharge letter

519 Letter in which the medical status and the treatment given to the patient and instructions for further treatment and medication is given to the general practitioner on the discharge of the patient from the hospital.

Electronic Health (eHealth)

ICT tools and services for health, used by healthcare professionals, institutions and administrations as well as utilities which provide patients directly with services related to healthcare.

Electronic Health Record (EHR)

520 Information, assembled and maintained in an electronic format, which pertains to the health status of an individual, and the health services delivered to an individual.

eBooking

521 System enabling appointments to be booked with health care professionals. Bookings can be done by either the health care personnel or by the patients/citizens.

Electronic Medical Record

522 Electronic record of health-related information on an individual that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organisation who are involved in the individual's health and care.

electronic Prescribing

523 System that enables the prescriber to send an accurate, error-free and understandable prescription electronically directly to a pharmacy.

Emergency department

524 Area of a hospital especially equipped and staffed for emergency care.

Electronic Health Record

525 Aggregate electronic record of health-related information on an individual that is created and gathered cumulatively across more than one health care organisation and is managed and consulted by licensed clinicians and staff involved in the individual's health and care.

Electronic Patient Record

526 Record about an individual patient stored in a healthcare provider's computer, in a database that is typically the property of the provider. It will usually contain the patient's demographic data and medical information collected only when the patient visits that provider.

Enterprise archive strategy (EAS)

527 Comprehensive information archiving strategy that is aligned with the company or the hospital's goals and performance needs.

Extranet

528 System of computers that makes it possible for a company and people outside the company to communicate and share information over the internet. Extranets also allow employees who work away from the office to connect to the office computers

Family planning centre

529 Medical facility focusing on regulating the number and spacing of children in a family (e.g. contraception and aborts)

Fingerprint system

530 Biometric system that compares a fingerprint pattern with a stored pattern to determine whether there's a match.

Full-Time Equivalents

531 Unit indicating the workload of an employed person in a way that makes workloads comparable across various contexts. For instance, 1 FTE means that a person works full-time worker or two people work half-time.

General Practitioner

532 Physician providing primary care.

Health alerts

533 Urgent messages from the Centers of Disease Control (CDC) to health officials requiring immediate action or attention.

Health Information Exchange (HIE)

534 HIE is transferring/sharing/enabling access to patient health information and data. Exchange may take place between different types of entities, such as care organisations within a country/region/community/or network of hospitals.

Health Information Security

535 Physical, technological, or administrative safeguards or tools used to protect identifiable health information from unwarranted access or disclosure.

Health Level 7 (HL7)

536 Application protocol for electronic data exchange in health care environments. The HL7 protocol is a collection of standard formats which specify the implementation of interfaces between computer applications from different vendors. This communication protocol allows healthcare institutions to exchange key sets of data amount different application systems. Flexibility is built into the protocol to allow compatibility for specialized data sets that have facility-specific needs.

Healthcare

537 Broad term that directly refers to different activities and means used to prevent or cure different processes of morbidity.

Hospice

538 Facility where care is provided for free or at very cheap price, most often for elderly people or terminally ill patients

Information System

539 Interconnected set of electronic information resources and/or applications under the same direct management control. A system normally includes hardware, software, information, data, applications, communications, and people. It is made up of databases, application programs, and manual and machine procedures. It also encompasses the computer systems that do the processing, as well as intermediary systems that route or perform some action as part of the processing.

Integrating the Healthcare Enterprises (IHE)

540 The IHE initiative defines integration profiles in the context of existing standards to enable information exchange among different software solution providers. These profiles are based on the corresponding medical workflows. Solution providers meet annually at so-called "Connectathon" events to test the interoperability of their products using the IHE integration profiles.

Intensive care unit

541 Unit in which is concentrated special equipment and specially train care of seriously ill patients requiring immediate and continuous attention.

International Standards Organisation (ISO)

542 Worldwide federation of national standards bodies from some 100 countries; one from each country. Among the standards it fosters is Open Systems Interconnections (OSI), a universal reference model for communication protocols. Many countries have national standards organisations, such as the U.S. American National Standards Institute (ANSI), that participate in and contribute to ISO standards development.

Interoperability

543 Ability of health information systems to work together within and across organisational boundaries, in order to advance the effective delivery of health care for individuals and communities.

Mobile emergency care provider

544 Mobile units providing care outside the hospital.

Operating room

545 Room equipped for performing surgical operations.

Organisational level

546 Between the different organisations or departments

Password

547 Confidential authentication information composed of a string of characters.

Picture Archiving and Communication System (PACS)

548 System enabling x-rays and scan images to be viewed on screen and managed, distributed and stored electronically

Primary care centre

549 Medical facility focusing on the initial treatment of medical ailments that are not life threatening

Privacy

550 Individual's or organisation's right to determine whether, when, and to whom, personal or organisational information is released. Also, the right of individuals to control or influence information that is related to them, in terms of who may collect or store it, and to whom that information may be disclosed.

Protection

551 Domain boundary within which security services provide boundary: a known level of protection against threats.

Recovery

552 Restoration of an information system back to an error-free and secure state from which normal operation can resume.

553 A disaster recovery is the process whereby an enterprise would restore any loss of data in the event of fire, vandalism, natural disaster, or system failure.

Referral letter

554 Letter sent from the medical director (whether a general practitioner or a specialist) referring a patient to another medical director for treatment in which major medical problems, major findings from previous medical exams are given.

Security

555 Refers to the physical, technological, or administrative safeguards or tools used to protect identifiable health data from unwarranted access or disclosure.

Semantic level

556 In terms of the use of terminologies and classifications for clinical, medical or statistical purposes.

Standard

557 Specification of the characteristics of some product or activity that has been agreed by a standards body operating on a national, a regional or a world basis. In the information systems area the key issue is that of ensuring that information systems can work together effectively and in the information security area the key issue is that the security provided by the component or system should be up to the standard specified. The European regional standards body concerned with Medical Informatics is CEN and conformance with European standards is a requirement for public bodies within the European Union when purchasing systems over a certain value.

Technical level

558 At the level of technical standards, architectures or platforms.

Tele-homecare/tele-monitoring services

559 System that sends and views radiological images from one location to another for the purposes of interpretation and/or consultation by a radiologist form outside the hospital.

Tele-radiology system

560 System that sends and views radiological images from one location to another for the purposes of interpretation and/or consultation by a radiologist form outside the hospital.

Value-added network

561 Private network provider (sometimes called a turnkey communications line) that is hired by a company.

7.3   Appendix 3: Final questionnaire

Country code			
NUTS2 code			
Hospital number			

Good morning/Good afternoon,

I am ………… calling from GDCC, a leading market research and consultancy agency. We are currently conducting an important survey for the European Commission on the deployment of ICT services in the European hospitals. I would have some questions regarding your hospital:

S1. Does this organisation have…?

Multiple possible answers

☐ S1.1. An emergency department

☐ S1.2. A routine and/or life-saving surgery operating room

☐ S1.3. An intensive care unit

☐ S1.4. Don't know **(do not read)**

☐ S1.5. None of the above

-> If S1.4, ask to be redirected to a more adequate person and repeat.

S2a. And is this organisation an acute or general hospital?

Only one answer possible

☐ S2a.1. Yes

☐ S2a.2. No

☐ S2a.3. Don't know **(do not read)**

->If S2a.3, ask to be redirected to the most adequate person and repeat.
If S2a.1, go to S3.
If [S2a.2 AND (S1.1 AND (S1.2 and/or S1.3))], go to S3
If any other case, go to S2b.

S2b. So, is this organisation mainly …?

Only one answer possible

☐ S2b.1. A psychiatric hospital

☐ S2b.2. A military hospital

☐ S2b.3. A police hospital

☐ S2b.4. A prison hospital

☐ S2b.5. A non-hospital primary care centre (by this, I mean an establishment gathering mainly general practitioners and eventually nurses and few specialists)

☐ S2b.6. A family planning centre

☐ S2b.7. A facility focusing on plastic surgery

☐ S2b.8. A hospice

☐ S2b.9. A mobile emergency care provider

☐ S2b.10. A fertility clinic

☐ S2b.11. A diagnostic imaging clinic

☐ S2b.12. Other: *Please specify*

☐ S2b.13. Don't know **(do not read)**

-> If any of these answers, close the interview.

S3. Could you tell me how many beds there are in your hospital?

Only one answer possible

☐ S3.1. Fewer than 101 beds

☐ S3.2. Between 101 and 250 beds

☐ S3.3. Between 251 and 750 beds

☐ S3.4. More than 750 beds

☐ S3.5. Don't know **(do not read)**

S4. Is this hospital...?

Only one answer possible

☐ S4.1. Public

☐ S4.2. Private

☐ S4.3. Private not for profit

☐ S4.4. Don't know **(do not read)**

Could you please transfer me to the person responsible for information and technical applications inside your hospital? It can be the Chief information officer, the ICT director/manager or the Operation manager for instance.

S5. Are you the CIO / IT director/manager and would you describe yourself as the person with the most knowledge on ICT related matters in {name organisation}?

Only one answer possible

☐ S5.1. Yes, that is me

☐ S5.2. No, that is someone else

-> if S5.2, ask to be redirected to the most adequate person and repeat.

-> Once in contact with the CIO, explain the survey purpose.

-> Send the letter (if necessary) and the electronic version of the questionnaire (if necessary). Inform on the possibility of answering the survey through internet

SURVEY

Block A. Characterisation

Q1. What is your current position in the hospital?

Only one answer possible

☐ Q1.1. Chief information officer

☐ Q1.2. ICT manager/director

☐ Q1.3. Chief operational officer (COO)/ Operations Manager

☐ Q1.4. Other: specify

Q2a. Could you please confirm that this hospital has…[answer question S3]

Only one answer possible

☐ Q2a.1. Yes

☐ Q2a.2. No

-> If Q2a.1, then go to Q3. If Q2a.2, then go to Q2b.

Q2b. Then, could you tell me how many beds there are in your hospital?

Only one answer possible

☐ Q2b.1. Fewer than 101 beds

☐ Q2b.2. Between 101 and 250 beds

☐ Q2b.3. Between 251 and 750 beds

☐ Q2b.4. More than 750 beds

☐ Q2b.5. Don't know **(do not read)**

Q3. And is this hospital …?

Only one answer possible

☐ Q3.1. An independent hospital on one site

☐ Q3.2. An independent hospital on multiple sites

☐ Q3.3. Part of a group of different hospitals: *specify how many hospitals in the group*

☐ Q3.4. Part of a group of care institutions: *specify how many care institutions in the group*

☐ Q3.5. Other: specify

Q4. Is this hospital a university hospital?

Only one answer possible

☐ Q4.1. Yes

☐ Q4.2. No

-> If Q4.2, then ask Q5

Q5. Is this hospital a non-university teaching hospital?

Only one answer possible

☐ Q5.1. Yes

☐ Q5.2. No

Q6. Total number of full time employees and/or in FTE (Full-time equivalent)

Multiple possible answers

☐ Q6.1. Number _____

☐ Q6.2. FTE _____

☐ Q6.3. Don't know

-> If Q6.1 and/or Q6.2, go to Q9. If Q6.3, go to Q7.

Q7. Total number of full time physicians and/or in FTE (Full-time equivalent)

Multiple possible answers

☐ Q7.1. Number _____

☐ Q7.2. FTE _____

☐ Q7.3. Don't know

-> If Q7.1 and/or Q7.2, go to Q9. If Q7.3, go to Q8.

Q8. Total number of full time nurses and/or in FTE (Full-time equivalent)

Multiple possible answers

☐ Q8.1. Number _____

☐ Q8.2. FTE _____

☐ Q8.3. Don't know

Q9. What is the catchment area of this hospital, in number of inhabitants?

☐ Q9.1. Number _____

☐ Q9.2. Don't know **(do not read)**

Q10. Number of Computed Axial Tomography scanners (CAT scanners)

☐ Q10.1. Number _____

☐ Q10.2. Don't know **(do not read)**

Q11. Number of Magnetic Resonance Imaging Units (MRI units)

☐ Q11.1. Number _____

☐ Q11.2. Don't know **(do not read)**

Q12. Number of full time employees in IT Department

Number _____

Q13. What part of the total Hospital's Budget does the IT budget represent?

Only one answer possible

☐ Q13.1. Less than 1%

☐ Q13.2. Between 1% and 3%

☐ Q13.3. Between 3.1% and 5%

☐ Q13.4. More than 5%

☐ Q13.5. Don't know **(do not read)**

Q14. What part of the IT budget is dedicated to outsourced services?

☐ Q14.1. 0% (no service outsourced)

☐ Q14.2. Less than 25%

☐ Q14.3. Between 25% and 49%

☐ Q14.4. Between 50% and 74%

☐ Q14.5. At least 75%

☐ Q14.6. Don't know **(do not read)**

Q15. Does your IT Department have a formal IT Strategic Plan?

Only one answer possible

☐ Q15.1. Yes

☐ Q15.2. No

☐ Q15.3. Don't know **(do not read)**

Q16. Does your Hospital receive any financial incentives from health plans and other organisations that are tied to the types of information technology systems (e.g. electronic health records or electronic prescribing systems) it adopts?

Only one answer possible

☐ Q16.1. Yes

☐ Q16.2. No

☐ Q16.3. Don't know **(do not read)**

Block B. ICT infrastructure

Q17. Do you have a computer system in your hospital?

Only one answer possible

☐ Q17.1. We do not have any computer system but only personal computers that are not part of a hospital-wide system

☐ Q17.2 We have an independent hospital-wide computer system

☐ Q17.3 Our computer systems are part of a network of different hospitals or hospital sites

☐ Q17.4 Our computers systems are part of a regional or national network

☐ Q17.5. Don't know **(do not read)**

Q18. Is your hospital computer system externally connected...?

Allow multiple answers for Q18.1 and Q18.2 only

☐ Q18.1 Yes, through an extranet i.e. using a secure Internet connection over the Internet

☐ Q18.2 Yes, through a value-added network or proprietary infrastructure

☐ Q18.3 Our computer system is not connected

☐ Q18.4. Don't know **(do not read)**

Q19. What type of Internet connection does your hospital have?

Only one answer possible

☐ Q19.1. Narrowband (Dial-up/PSTN) ISDN (128 kbit/smax)

☐ Q19.2. Broadband (below 30 Mbps)

☐ Q19.3. Broadband (from 30 Mbps to 49 Mbps)

☐ Q19.4. Broadband (from 50 Mbps to 100Mbps)

☐ Q19.5. Broadband (above 100 Mbps)

☐ Q19.6. No Internet connection **(do not read)**

☐ Q19.7. Don't know **(do not read)**

Q20. How does your hospital support wireless communications?

Only one answer possible

☐ Q20.1. There is a single, unified wireless infrastructure capable of supporting most of the applications

☐ Q20.2. There are individual wireless networks for discrete applications

☐ Q20.3. There is no wireless infrastructure

☐ Q20.4. Don't know **(do not read)**

Q21. Does your hospital have videoconferencing facilities (for home monitoring of patients, contact with other institutions for administrative, medical or education purposes)?

Multiple possible answers

☐ Q21.1. Yes
☐ Q21.2. No
☐ Q21.3. Don't know **(do not read)**

Q22. How are you currently managing the following services?

Multiple answers possible per line

	Currently managed in-house	Currently outsourced	Don't know **(do not read)**
Q22.1. Recording and storage of patient's medical digital data or other clinical data	☐	☐	☐
Q22.2. Archiving of patient's medical digital record	☐	☐	☐
Q22.3. Recording and storage of staff digital data (personal data, position/grade, contact details, availability, remuneration, etc.)	☐	☐	☐
Q22.4. Archiving of staff digital records (personal data, remuneration slips, etc.)	☐	☐	☐
Q22.5. Storage of digital financial data	☐	☐	☐
Q22.6. Issue of invoices	☐	☐	☐
Q22.7. Supplier invoice management	☐	☐	☐
Q22.8. Managed services (i.e. system support and system maintenance)	☐	☐	☐
Q22.9. Hosting of e-mails and website	☐	☐	☐

Block C. ICT applications

Q23. Which type of Electronic Medical Records (EMRs) / Electronic Health Records (EHRs) / Electronic Patient Records (EPRs) does your hospital mainly use? By this type of application I mean a computer-based patient record system which contains patient-centric, electronically-maintained information about an individual's health status and care.

Only one answer possible

☐ Q23.1. A hospital-wide EMR/EHR/EPR shared by all the clinical service departments
☐ Q23.2. Multiple local/departmental EMR/EHR/EPR systems, which share information with a central EMR/EHR/EPR system
☐ Q23.3. Multiple local/departmental EMR/EHR/EPR systems, but they do not share information
☐ Q23.4. None, we do not use EMR/EHR/EPR systems in our hospital
☐ Q23.5. Don't know **(do not read)**

Q24. Do patients have online access to their electronic patient records?

Only one answer possible

☐ Q24.1. Yes, to everything
☐ Q24.2. Yes, but only to certain data (e.g. results and protocols)
☐ Q24.3. No
☐ Q24.4. Don't know **(do not read)**

Q25. Does the hospital use a Picture Archiving and Communication System (PACS)? By PACS I mean a system which enables images such as x-rays and scans to be stored electronically and viewed on screens, creating a near filmless process. Examples of PACS include Radiology Information System (RIS) or cardiology IT (Cardiology and Visualisation Information System (CVIS) and cardiology PACS availability).

Only one answer possible

☐ Q25.1. Yes
☐ Q25.2. No
☐ Q25.3. Don't know **(do not read)**

Q26. Which of the following computerised systems has the hospital integrated?

Multiple possible answers

☐ Q26.1. An integrated system for billing management
☐ Q26.2. An integrated system to send or receive electronic referral letters
☐ Q26.3. An integrated system to send electronic discharge letters
☐ Q26.4. An integrated system for tele-radiology
☐ Q26.5. A computerised system for ePrescribing
☐ Q26.6. A medical decision support system

☐ Q26.7. Don't know **(do not read)**

☐ Q26.8. None of the above **(do not read)**

Q27. Does the hospital have the following computer-based system or applications...

Multiple possible answers

☐ Q27.1. An adverse health events reporting system?

☐ Q27.2. An electronic transmission of results of clinical tests? (e.g. laboratory results)

☐ Q27.3. An electronic service order placing? (e.g. test/diagnostic results)?

☐ Q27.4. An electronic appointment booking system?

☐ Q27.5. Tele-homecare/tele-monitoring services to outpatients (at home)?

☐ Q27.6. A critical care information system (anaesthesia, emergency, operating room, intensive care unit information system)?

☐ Q27.7. A medical/nursing document management system?

☐ Q27.8. A business intelligence information system (clinical and administrative)?

☐ Q27.9. Don't know **(do not read)**

☐ Q27.10. None of the above **(do not read)**

Block D. Health Information Exchange

Q28. Does your hospital exchange electronically clinical care information about patients (for instance, clinical history or results from medical tests) with any of the following providers?

Multiple possible answers

☐ Q28.1. With a hospital or hospitals outside your own hospital system

☐ Q28.2. External general practitioners

☐ Q28.3. External specialists

☐ Q28.4. Health care providers in other EU countries

☐ Q28.5. Health care providers outside the EU countries

☐ Q28.6. Other: please specify

☐ Q28.7. None

☐ Q28.8. Don't know **(do not read)**

Q29. Does your hospital exchange electronically laboratory results information about patients with any of the following providers?

Multiple possible answers

☐ Q29.1. With a hospital or hospitals outside your own hospital system

☐ Q29.2. External general practitioners

☐ Q29.3. External specialists

☐ Q29.4. Health care providers in other EU countries

☐ Q29.5. Health care providers outside the EU countries

☐ Q29.6. Other: please specify

☐ Q29.7. None

☐ Q29.8. Don't know **(do not read)**

Q30. Does your hospital exchange electronically medication lists information about patients with any of the following providers?

Multiple possible answers

☐ Q30.1. With a hospital or hospitals outside your own hospital system

☐ Q30.2. External general practitioners

☐ Q30.3. External specialists

☐ Q30.4. Health care providers in other EU countries

☐ Q30.5. Health care providers outside the EU countries

☐ Q30.6. Other: please specify

☐ Q30.7. None

☐ Q30.8. Don't know **(do not read)**

Q31. Does your hospital exchange electronically radiology images and reports about patients with any of the following providers?

Multiple possible answers

☐ Q31.1. With a hospital or hospitals outside your own hospital system

☐ Q31.2. External general practitioners

☐ Q31.3. External specialists

☐ Q31.4. Health care providers in other EU countries

☐ Q31.5. Health care providers outside the EU countries

☐ Q31.6. Other: please specify

☐ Q31.7. None

☐ Q31.8. Don't know **(do not read)**

-> If Q23.1 or Q23.2, ask Q32.

Q32. You said that your hospital uses electronic patient records (EPRs) which share information. Do you encounter interoperability problems between the different departmental EPR systems? By interoperability problems, I mean that the systems are not connected and fail to talk to each other.

Multiple possible answers

☐ Q32.1. Yes, at the technical level.

☐ Q32.2. Yes, at the semantic level.

☐ Q32.3. Yes, at the organisational level.

☐ Q32.4. Never

☐ Q32.5. Don't know **(do not read)**

-> If Q23.3, ask Q33

Q33. You said that your hospital uses electronic patient records (EPRs) which does not share information. Considering your technical skills in relation to hospital system interoperability, do you think you need additional training?

Only one answer possible

☐ Q33.1. Yes

☐ Q33.2. No

☐ Q33.3. Don't know **(do not read)**

Q34. Which standards does your system support or comply with?

Multiple possible answers

☐ Q34.1. HL7

☐ Q34.2. IHE integration profiles

☐ Q34.3. CEN/ISO EN 13606

☐ Q34.4. DICOM

☐ Q34.5. OpenEHR

☐ Q34.6. Don't know **(do not read)**

Block E. Security and privacy

Q35. Is there any regulation in use that guarantees the security and privacy of electronic patient medical data?

Multiple possible answers

☐ Q35.1. Yes, at national level
☐ Q35.2. Yes, at regional level
☐ Q35.3. Yes, at hospital level
☐ Q35.4. Other **(do not read)**
☐ Q35.5. No, there is no regulation
☐ Q35.6. Don't know **(do not read)**

Q36. Which of the following security measures are taken to protect the patient data stored and transmitted by the hospital's IT system?

Multiple possible answers

☐ Q36.1. Encryption of stored data
☐ Q36.2. Encryption of transmitted data
☐ Q36.3. Workstations with access only through health professional cards
☐ Q36.4. Workstations with access only through fingerprint information
☐ Q36.5. Workstations with access only through a password
☐ Q36.6. Data entry certified with digital signature
☐ Q36.7. Other: ....
☐ Q36.8. Don't know **(do not read)**
☐ Q36.9. None of the above **(do not read)**

Q37. Are there clear structured rules on accessing (reading-writing) patients' electronic medical data?

Only one answer possible

☐ Q37.1. Yes
☐ Q37.2. No
☐ Q37.2. Don't know **(do not read)**

Q38. Does your hospital have an enterprise archive strategy for long-term storage and disaster recovery? By enterprise archive strategy, I mean a comprehensive information archiving strategy that is aligned with your hospital's goals and performance needs. Disaster recovery implies the ability to recover mission-critical computer systems as required to support the hospital's continuity.

Only one answer possible

☐ Q38.1. Yes
☐ Q38.2. No
☐ Q38.3. Don't know **(do not read)**

Q39. Please estimate how quickly your organisation can restore critical clinical information system operations if a disaster causes the complete loss of data at your hospital's primary data centre. Interviewer: By restoration of clinical information systems, we mean those applications that are considered "mission critical", level 1".

Only one answer possible

☐ Q39.1. Immediate (we have a fully redundant data centre)
☐ Q39.2. Less than 24 hours
☐ Q39.3. Less than 2 days
☐ Q39.4. Less than 1 week
☐ Q39.5. Less than 1 month
☐ Q39.6. More than 1 month
☐ Q39.7. Don't know **(do not read)**

Block F. IT functionalities

Q40. "Electronic Medical Records" (EMRs) or "Electronic Health Records" (EHRs) or "Electronic Patient Records" (EPRs) are terms which refer to systems that are used by healthcare professionals (doctors and nurses) to enter, store, view, and manage patient health and administrative information and data. Does your hospital have this type of ICT-supported systems?

Only one answer possible

☐ Q40.1. Yes
☐ Q40.2. No
☐ Q40.3. I don't know **(do not read)**

-> if Q40.1, go to Q41. If Q40.2, go to Q43

Q41. Do your EHRs or any other ICT system allow health professionals to view and/or to input the following types of information? Please indicate the extent to which they are implemented (fully implemented means it has completely replaced paper record for the function) in your hospital and the extent to which health professionals use them.

If feature D, ask (E). If a feature is D or E skip the related "usage" question. One answer per line.

	Availability						Usage (if A, B or C)			
	(A) Fully implemented across all units	(B) Fully implemented in at least 50% of units	(C) Fully implemented in less than 50% of units	(D) Not in place	(E) Considering implementing	Don't know (do not read)	YES, routinely	YES, occasionally	No	Don't know (do not read)
Q41.1. Medication list	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.2. Prescription list	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.3. Lab test results	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.4. Radiology test results (reports)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.5. Radiology test results (images)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.6. Problem list / diagnoses	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.7. Reason for encounter	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.8. Allergies	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.9. Encounter Notes, Clinical notes	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.10. Immunizations	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.11. Vital signs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.12. Patient demographics	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.13. Symptoms (reported by patient)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.14. Medical history	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.15. Ordered tests	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.16. disease management or care plans (e.g. diabetes)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q41.17. Finance / billing information	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Q42. Do your EHRs or any other ICT system have any of the clinical decision support functionalities listed below (such as real-time alerts or prompts)? Please indicate the extent to which these are implemented (fully implemented means it has completely replaced paper record for the function) in your hospital and the extent to which health professionals use them.

If feature D, ask (E). If a feature is D or E skip the related "usage" question. One answer per line.

	Availability						Usage (if A, B or C)			
	(A) Fully implemented across all units	(B) Fully implemented in at least 50% of units	(C) Fully implemented less than 50% of units	(D) Not in place	(E) Considering implementing	Don't know (do not read)	YES, routinely	YES, occasionally	No	Don't know (do not read)
Q42.1. Clinical guidelines and best practices (e.g. alerts, prompts)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q42.2. Drug-drug interactions	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q42.3. Drug-allergy alerts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q42.4. Drug-lab interactions	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q42.5. Contraindications (e.g. based on age, gender, pregnancy status)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q42.6. Alerts to a critical laboratory value	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Q43. Health Information Exchange (HIE) is electronically transferring / sharing / enabling access to patient health information and data. Do your EHRs or any other ICT systems in place in your hospital allow health professionals to engage into any of the following forms of HIE?
Please indicate the extent to which these are implemented (fully implemented means it has completely replaced paper record for the function) in your hospital and the extent to which health professionals use them.

If feature D, ask (E). If a feature is D or E skip the related "usage" question. One answer per line.

	Availability						Usage (if A, B or C)			
	(A) Fully implemented across all units	(B) Fully implemented in at least 50% of units	(C) Fully implemented in less than 50% of units	(D) Not in place	(E) Considering implementing	Don't know (do not read)	YES, routinely	YES, occasionally	No	Don't know (do not read)
Q43.1. Interact with patients by email about health-related issues	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.2. Make appointments at other care providers on your patients' behalf	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.3. Send/receive referral and discharge letters	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.4. Transfer prescriptions to pharmacists	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.5. Exchange medical patient data with other healthcare providers and professionals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.6. Receive laboratory reports	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.7. Receive and send laboratory reports and share them with other healthcare professionals /providers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.8. Exchange patient medication lists with other healthcare professionals / providers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.9. Exchange radiology reports with other healthcare professionals / providers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.10. Exchange medical patient data with any healthcare provider in other countries	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.11. Certify sick leaves	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q43.12. Certify disabilities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Q44. This is a question about "telehealth" which is the use of broadband-enabled information and communication technology to deliver health services, medical education, and health education remotely. It includes both clinical elements of the health care system such as remote consultations with patients and remote monitoring of their vital signs and health status, and non-clinical elements such as distance training. Please indicate the extent to which these are implemented (fully implemented means it has completely replaced paper record for the function) in your hospital and the extent to which health professionals use them.

If feature D, ask (E). If a feature is D or E skip the related "usage" question. One answer per line.

	Availability						Usage (if A, B or C)			
	(A) Fully implemented across all units	(B) Fully implemented in at least 50% of units	(C) Fully implemented in less than 50% of units	(D) Not in place	(E) Considering implementing	Don't know **(do not read)**	YES, routinely	YES, occasionally	No	Don't know **(do not read)**
Q44.1. Training (i.e. for continuing Medical education)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q44.2. Holding consultations with other healthcare practitioners	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q44.3. Holding consultations with patients	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Q44.4. Monitoring patients remotely (i.e. transmission of vital signs from patients' homes)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Q45. The implementation of IT systems within the hospitals allows the transition from paper-based systems to a fully electronically-based system. Please select what is the position of your hospital in this transition
Only one answer possible

Q45.1 Totally paper based	Q45.2	Q45.3	Q45.4	Q45.5 Hybrid model	Q45.6	Q45.7	Q45.8	Q45.9 Totally electronically based
☐	☐	☐	☐	☐	☐	☐	☐	☐

Block G. Hospital statistics

Q46. Number of hospital discharge during 2011 (or latest data available)
☐ Q46.1. Number _____
☐ Q46.2. Don't know **(do not read)**

Q47. Average length of stay in this hospital during 2011 (or latest data available)
☐ Q47.1. Number _____
☐ Q47.2. Don't know **(do not read)**

Q48. Number of emergency visits during 2011 (or latest data available)
☐ Q48.1. Number _____
☐ Q48.2. Don't know **(do not read)**

Q49. Number of outpatient consultations during 2011 (or latest data available)
☐ Q49.1. Number _____
☐ Q49.2. Don't know **(do not read)**

7.4 Appendix 4: Details on the methodological approach

This section gives further details on the methodology used.

7.4.1 Preparation of the questionnaire

7.4.1.1 Initial preparation of the questionnaire

562 The questionnaire was mainly based on the "eHealth Benchmarking Study III" questionnaire and additional sources (cf. Chapter 3).

563 The questionnaire was divided into two parts:

1. A screener part, with general questions regarding the establishment to be asked at the hospital switchboard. The information collected was used for the selection of acute care hospitals and for the stratification of the hospitals (see Section 3.2.2).
2. The actual body of the questionnaire with the questions asked to the Chief Information Officers of acute care hospitals.

564 The draft questionnaire (English version) was ready on Monday 24 September 2012 and was programmed into a Computer-Assisted Telephone Interviewing (CATI) application.

7.4.1.2 Translation of the questionnaire

565 The translations were started on 26 September 2012. The standard English questionnaire was translated into 22 other languages by a professional translation agency with experience in translating questionnaires.

Country	Language	Country	Language
Austria	German	**Italy**	Italian
Belgium	French, Dutch	**Latvia**	Latvian
Bulgaria	Bulgarian	**Lithuania**	Lithuanian
Croatia	Croatian	**Luxembourg**	French, German
Cyprus	Greek	**Malta**	English
Czech Republic	Czech	**Netherlands**	Dutch
Denmark	Danish	**Norway**	Norwegian
Estonia	Estonian	**Poland**	Polish
Finland	Finnish	**Portugal**	Portuguese
France	French	**Romania**	Romanian
Germany	German	**Slovenia**	Slovenian
Greece	Greek	**Slovakia**	Slovak
Hungary	Hungarian	**Spain**	Spanish
Iceland	English	**Sweden**	Swedish
Ireland	English	**United Kingdom**	English

566 Translations were then double-checked by GDCC evaluators and PwC native speakers. Where necessary, country-specific changes were suggested and implemented. After the review by evaluators of GDCC, all translated questionnaires were provided to IPTS for review and confirmation.

567 The translations have been adapted several times, due to numerous changes in the questionnaire. All were cross-checked by a native speaker once adapted.

7.4.1.3 Testing the questionnaire

568 During the pilot phase, from 2 October to 22 October 2012, 122 interviews were conducted. 21 out of 30 countries were reached, covering most of the EU languages during this period. The remaining languages were tested after the pilot phase and small adjustments were implemented.

569 The aim of the pilot phase was to detect three different types of issues:

- Wording of the questions and answers: identified misunderstandings or requests for details by the interviewee;
- Inability to answer: respondents did not have the answer, searched in their files on their computer or called their colleagues. These issues affected the length of the interview;
- Structuring of the questionnaire: improvements that could be brought to the questionnaire to ensure a better flow of questions during the interview.

570 All the identified issues were discussed with IPTS, and improvements were implemented. The final version of the questionnaire was ready on 31 October 2012 and is presented in Appendix 3: Final questionnaire.

7.4.2   Sampling methodology

571 The methodology used to define the appropriate sample in each of the 30 countries surveyed follows a four-step approach:

1. Estimation of the overall universe;
2. Implementation of a census strategy;
3. Definition of sample approach in each country;
4. Calculation of error margins and confidence intervals.

7.4.2.1   Estimation of the overall universe

572 To estimate the overall universe, a number of sources were consulted and analysed. The starting point was the sources provided in the previous version of the eHealth survey from 2010. The sources for each individual country were provided within the overall universe of 12,230 hospitals.

573 Therefore, the first step for the 2012 version of the study was to update the estimated universe by initially validating the sources used in the previous study. This validation demonstrated that while many of the sources were no longer available or accessible, others used commercial list brokers, which could not be considered reliable for the definition of any universe.

574 In addition, two other major sources were consulted during the validation process:

- The list of hospitals from WHO for the selected 30 countries;
- National Ministry of Health of each country.

575 In our analysis, we found out that the lists provided by the National Ministries of Health were more frequently updated than those of WHO. As a consequence, the former were most suitable to be used as a reference to estimate the universe.

Figure 173 below illustrates the process followed to define the universe.

Figure 173: Estimation of the acute care hospitals universe
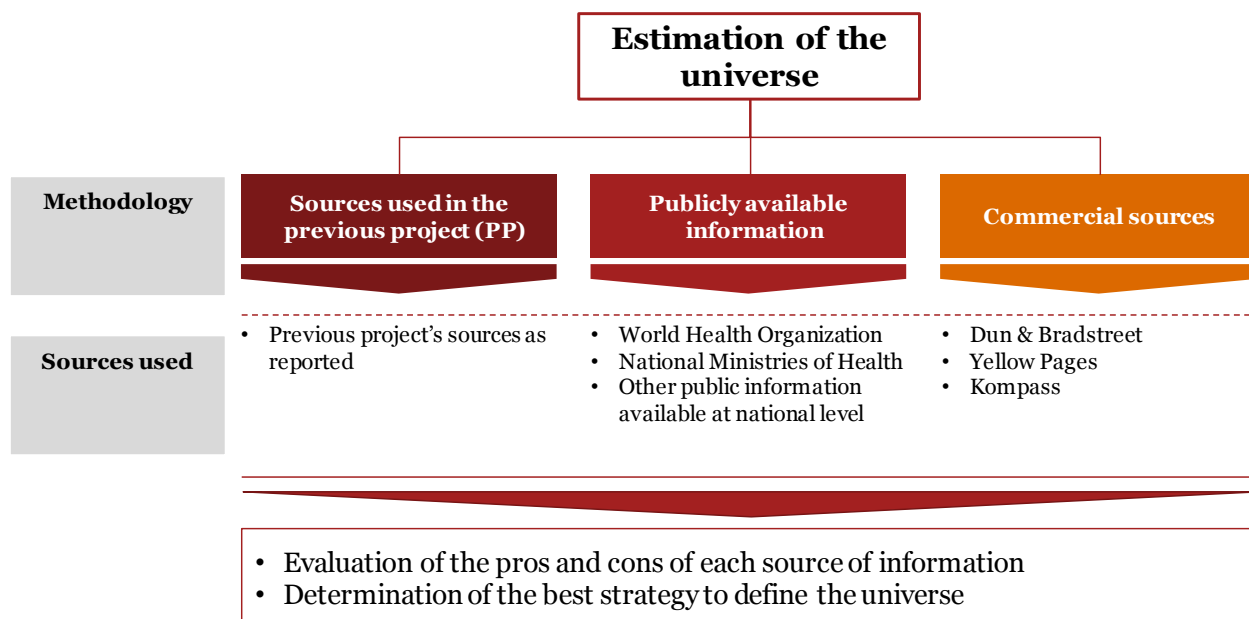
The established universe according to this analysis amounted to 8,199 acute care hospitals[88].

7.4.2.2   Implementation of a census strategy

576   The proposed census methodology consisted in contacting every hospital in each country within the universe. All entities contacted during the census were asked for ownership, size and acute hospital status according to the agreed definition. Their postal code was recorded so the region could be defined.

577   As a consequence, the census revealed the correct distribution of size category and ownership, by country and region. It also provided information that could not be obtained from reliable sources prior to the fieldwork. In addition, the census can now be used for future surveys as a reliable reference. Finally, non-response rate corrections were applied at the end of the data collection to ensure representativeness.

7.4.2.3   Determination of the sampling approach by country

578   The census methodology enabled us to contact every hospital within each country, define the universe size and, therefore, the sample approach to be used in each country.

579   Out of the 26,650 hospitals identified in the EU27+3, 5,424 are acute care hospitals. Of these, we interviewed on average 32% of them, i.e. 1,717 acute care hospitals.

---

88   The definition of "acute care hospital" differs according to the country. In order to have a homogeneous definition across EU27+3, we will screen all the hospitals during the census phase. The screening methodology is explained in the next sections.

The details of each country are listed below:

Table 67: Sampling approach by country

Country	Universe	Acute care hospitals	Sample achieved	Response rate
Austria	242	132	43	33%
Belgium	436	120	50	42%
Bulgaria	388	109	62	57%
Croatia	75	22	11	50%
Cyprus	70	22	13	59%
Czech Republic	470	142	40	28%
Denmark	270	54	16	30%
Estonia	136	25	12	48%
Finland	620	46	26	57%
France	7649	997	319	32%
Germany	3847	1295	201	16%
Greece	687	120	68	57%
Hungary	492	102	43	42%
Iceland	14	10	9	90%
Ireland	492	42	23	55%
Italy	2517	497	196	39%
Latvia	138	32	19	59%
Lithuania	219	63	32	51%
Luxembourg	7	7	3	43%
Malta	10	3	2	67%
Netherlands	606	114	26	23%
Norway	100	28	6	21%
Poland	2411	459	149	32%
Portugal	589	73	41	56%
Romania	1042	166	85	51%
Slovakia	391	72	33	46%
Slovenia	186	14	6	43%
Spain	1311	478	124	26%
Sweden	246	78	26	33%
United Kingdom	889	102	33	32%
Total	**26 550**	**5 424**	**1 717**[89]	**32%**

---

[89] This base does not include the 36 duplicated records of the acute care hospitals belonging to NHS Trusts of the UK. If we include them, total sample is 1,753 hospitals.

The following elements have been taken into consideration for the stratification of the sample:

Table 68: Elements for proportional sampling

What	How	Source of information
Location	Country / NUTS 2 classification	Answer in questionnaire (postcode)
Ownership	Public, private, other	Answer in questionnaire
Size class	Number of beds	Answer in questionnaire
Acute hospital	Definition implemented in screening questions	Answer in questionnaire

580   The elements for proportional sampling cited in the table above were applied to the sample during the screener part of the questionnaire.

581   The process followed to stratify the sample by country is as follows:

1. Call all hospitals within a country and ask them whether they are acute or not (based on screener criteria). Acute care hospitals are defined as follows:
   a. Respondents considers that the hospital is an acute or general hospital; and/or
   b. The hospital has an emergency department, plus a routine and/or life-saving surgery operating room and/or an intensive care unit.
2. Ask for the number of beds;
3. Ask for the ownership status (public vs. private);
4. Record the postal code.

7.4.2.4   Calculation of error margins and confidence intervals

582   For the countries in each of the clusters, an initial sample figure was calculated as well as the related error margins.

583   These error margins represent a measure of the variability of estimates due to sampling error and so enable data users to measure the range of uncertainty around each estimate. Two error margins were calculated for each country, based on answer characteristics of 30% and 50% (corresponding to different assumed levels of accuracy or, in other words, sampling errors).

584   The confidence interval as computed below corresponds to the range of values of sample observations that contain the true parameter (here, with the final sample figures) value within a given probability of 95%.

585 The numbers are illustrated in the table below.

Table 69: Sampling and error margins by country

Country	Population	Actual number of completed interviews	Final response rate	Error margin Finding 30%	Error margin Finding 50%
Austria	132	43	33%	9	10
Belgium	120	50	42%	7	8
Bulgaria	109	62	57%	5	5
Croatia	22	11	50%	14	15
Cyprus	22	13	59%	11	12
Czech Republic	142	40	28%	10	11
Denmark	54	16	30%	16	18
Estonia	25	12	48%	14	15
Finland	46	26	57%	8	9
France	997	319	32%	3	4
Germany	1295	201	16%	5	6
Greece	120	68	57%	5	5
Hungary	102	43	42%	8	9
Iceland	10	9	90%	3	4
Ireland	42	23	55%	9	9
Italy	497	196	39%	4	4
Latvia	32	19	59%	9	9
Lithuania	63	32	51%	8	9
Luxembourg	7	3	43%	35	38
Malta	3	2	67%	32	35
Netherlands	114	26	23%	14	15
Norway	28	6	21%	30	33
Poland	459	149	32%	5	5
Portugal	73	41	56%	6	7
Romania	166	85	51%	5	5
Slovakia	72	33	46%	9	9
Slovenia	14	6	43%	23	25
Spain	478	124	26%	6	7
Sweden	78	26	33%	12	13
United Kingdom	102	33	32%	11	12
EU27+3	5424	1 717[90]	32%		

---

[90] This base does not include the duplicated records for the underlying acute hospitals of the UK NHS Trusts. If we include them, we would achieve a total sample of 1,753 hospitals.

7.4.3   Data gathering

586   The objective of the data collection stage was to assure the highest degree of respondent cooperation in participating and completing the survey.

587   For this purpose, we prepared, collected and processed the survey responses. High-quality responses were also guaranteed and validated by the data cleansing process that we put in place.

588   We prepared, collected and processed the data from 2 October 2012 to early February 2013.

589   Contact with the respondents was done via telephone, directly through the acute hospital's main switchboard or using the direct extension of the target respondent when available. The objective was to obtain a full response to the screener during the first call and obtain the name/number of the CIO to determine the current universe of acute hospitals. The subsequent calls made aimed at obtaining a response to the interview (which rarely happened during the first call).

590   The initial contact with respondents and all subsequent interviews were conducted in the various survey languages by GDCC's staff, which comprises native speakers in each of the interview languages.

591   By default, the screening of hospitals was carried out via CATI. The interviewer's objective was to conduct a CATI interview; however, in the cases where the interviewee requested to respond via an online questionnaire, the option has been made available.

592   The data were collected via an online link after having been recorded (or input) directly by the interviewer or the respondent (in case the respondent requested to complete an online survey).

593   A letter outlining the objectives of the study and a printable PDF version of the questionnaire has also been made available for those respondents wishing to obtain more information prior to accepting to participate in the study. A copy of this letter is available in Appendix 5: Awareness letters.

7.4.4   Data analysis

594   The data collected has been analysed using cross-tabulations generated by SPSS.

595   Each question has been analysed at:

- European level: EU27+3;
- Country level;
- Size of hospital level (Fewer than 101 beds, Between 101 and 250 beds, Between 251 and 750 beds, More than 750 beds);
- Type of hospital (i.e. ownership) level (Public, Private, Private not for profit).

596   When analysing the data at country level as well as by size and type of hospital, only valid answers have been taken into consideration. This means that the "don't know" option was not taken into consideration and therefore, response rates were recalculated based on the total sample size minus the number of respondents who said "don't know" at that specific question.

597   Results were analysed at European and country level in chapter 4. The country reports (chapter 5) include the analysis of the 13 indicators already defined in the 2010 study as well as the analysis of these indicators by size and type of hospitals. Wherever possible, when the sample size was sufficient, an analysis of these indicators at NUTS level has been conducted, including a test of statistical significance at the 95% and 99% confidence interval.

7.5   *Appendix 5: Awareness letters*

EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Prospective Technological Studies (Seville)
Information Society Unit

Seville, 1st October 2012

Ref: Study on "European Hospital Survey: Benchmarking deployment of eHealth Services (2012-13)"

Dear Sir or Madam,

The Institute for Prospective Technological Studies (IPTS), based in Seville (Spain), is one of seven European Commission research institutes, forming the Directorate General Joint Research Centre (JRC). Its mission is to provide techno-economic analysis in support of the EU policy-making process. The prime objectives of IPTS are to monitor and analyse science and technology developments, their inter-relationship with the socio-economic contexts and their implication for future policy development.

The IPTS has commissioned to PwC and GDCC a survey to *Benchmark the deployment of eHealth Services by acute hospitals across Europe*. This study is part of a series evaluating progress in relation to the adoption and use of ICT in the healthcare sector and elaborating a composite indicator. It is expected that the survey results will benefit policy making at both national and European level as well as enable individual hospitals to monitor their performance against the overall context.

PwC and GDCC will be contacting you in order to receive your valuable input. Therefore, we would be most grateful if you could contribute to our survey, in the form of a telephone interview. Alternatively, a web link can be provided, for online response to the questionnaire.

The final period for collecting survey responses is the beginning of December 2012; hence it would be greatly appreciated if you complete the online questionnaire or supply a telephone interview before this date.

Please notice that the results of the study, including the composite indicator, will be shared with participants.

We thank you in advance for your time and collaboration.

Yours faithfully,

Ioannis Maghiros
Project Leader
Institute for Prospective Technological Studies
DG JRC - European Commission

Sehr geehrte Damen und Herren,

Das Institut für technologische Zukunftsforschung (engl. Institute for Prospective Technological Studies, IPTS) mit Sitz in Sevilla (Spanien) ist eins der sieben Forschungsinstitute der Europäischen Kommission, die dem Direktorat Joint Research Center (JRC) unterstellt sind.

Die Mission von IPTS ist es technologisch-ökonomische Analysen zur Verfügung zu stellen, die die EU-Politikgestaltung unterstützen. Die Hauptziele des IPTS beinhalten somit das Analysieren und Überprüfen von wissenschaftlichen und technologischen Entwicklungen, ihre Beziehung zu den sozio-ökonomischen Zusammenhängen und ihre Auswirkung auf die zukünftige Politikgestaltung/-entwicklung. Eines der abgedeckten Forschungsgebiete des IPTS ist das "Monitoring von eHealth" in Europa.

Das IPTS hat daher eine Studie in Auftrag gegeben um ein Benchmarking über den Einsatz von elektronischen Gesundheitsdiensten (eHealth Services) in Akutkrankenhäusern in Europa durchzuführen. Diese Studie ist ein Teil einer Serie von Studien, die das Ziel verfolgen den Verbreitungsgrad bezüglich der Einführung und der Benutzung von Informations- und Kommunikationstechnologie im Gesundheitswesen zu evaluieren. Diese Studienserie berücksichtigt die jüngsten Entwicklungen und den Einsatz von Diensten die in dem sogenannten EU-eHealth-Aktionsplan enthalten sind.

Ihre Meinung ist uns wichtig! Wir haben daher die Unternehmen PwC und GDDC beauftragt Sie zu kontaktieren um Ihren wertvollen Beitrag zu dieser Studie zu erhalten. Daher wären wir Ihnen sehr dankbar wenn Sie uns etwas Zeit schenken können um an unserer Studie in Form eines telefonischen Interviews teilzunehmen. Alternativ können wir Ihnen einen Internet-Link zur Verfügung stellen um den Fragebogen online zu beantworten.

Die Datenerhebung für diese Studie läuft bis Ende Januar 2013; daher wären wir Ihnen sehr verbunden, wenn wir Sie vor diesem Zeitpunkt entweder telefonisch befragen oder Ihren online ausgefüllten Fragebogen erhalten könnten.

Wir versichern Ihnen dass Ihre Daten strikt vertraulich behandelt werden und nur in aggregierter Form ausgewertet werden.

Im Gegenzug für Ihren geschätzten Beitrag werden wir Ihnen Zugriff auf die Studienergebnisse gewähren. Wir erwarten, dass diese Studienresultate für die Politikgestaltung sowohl auf nationaler als auch auf europäischer Ebene von Nutzen sein werden. Die einzelnen Krankenhäuser werden ebenfalls davon profitieren, indem sie ihre eigene Leistungsfähigkeit mit der Leistungsfähigkeit anderer Krankenhäuser vergleichen können.

Wir danken Ihnen im Voraus für Ihre Zeit und Ihre Mitarbeit.

Mit freundlichen Grüßen

Ioannis Maghiros
Project Leader
Institute for Prospective Technological Studies
DG JRC – European Commission

Egregia Signora, Egregio Signore,

L'Istituto per gli Studi prospettici tecnologici (Institute for Prospective Technological Studies, IPTS), con sede a Siviglia (Spagna) è uno dei sette istituti di ricerca della Commissione Europea che formano la Direzione Generale del Centro Comune di Ricerca (Joint Research Center, JRC). La sua missione è di fornire analisi tecnico-economiche a supporto dei processi decisionali relativi alle politiche dell'UE. Gli obiettivi primari dell'IPTS sono di osservare ed esaminare gli sviluppi della scienza e della tecnologia, la loro correlazione con gli eventi socio-economici e le loro implicazioni per le politiche future.

L'IPTS ha intrapreso uno studio per misurare lo sviluppo dei servizi sanitari elettronici (eHealth Services) negli ospedali europei. Questo studio fa parte di una serie di indagini volte a misurare l'evoluzione nell'uso dell'ICT (Tecnologie dell'informazione e della comunicazione) nel settore sanitario. Lo studio prende in considerazione i più recenti sviluppi nonché le implementazioni dei servizi previsti dall'e-Health Action Plan e permetterà agli stati membri e ai singoli ospedali di valutare la propria situazione rispetto allo stato globale dell'UE.

Lo studio è stato commissionato a PwC e alla GDCC, due società di consulenza le quali La contatteranno per avere la Sua preziosa opinione. Per questo Le saremmo grati se potesse dedicare un po' del Suo tempo a questo studio che sarà effettuato sotto forma di intervista telefonica. In alternativa, Le sarà fornito un web-link per rispondere ad un questionario online.

Il termine ultimo per raccogliere le risposte al questionario è il 31 gennaio 2013; per questo Le saremmo grati se potessimo intervistarLa telefonicamente o ricevere il Suo questionario online prima della fine del mese.

Si prega di notare che i dati comunicati saranno trattati in forma strettamente confidenziale e che saranno utilizzati a fini statistici e in forma aggregata.

Come espressione della nostra gratitudine ai partecipanti per la loro collaborazione, i risultati dello studio saranno distribuiti ai partecipanti.

Ringraziandola anticipatamente per la Sua collaborazione,

Le porgiamo i nostri più distinti saluti,

Ioannis Maghiros
Project Leader
Institute for Prospective Technological Studies
DG JRC – European Commission

7.6   Appendix 6: Acknowledgements

598   This study has been conducted by PwC Luxembourg in cooperation with GDCC for the European Commission's Directorate General Joint Research Centre and its Institute of Prospective Technological Studies in Sevilla, Spain (DG JRC – IPTS).

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- Christine von Reichenbach, Manager.

Quality Review panel:

- Dariush Yazdani, Partner, Research unit leader;
- Philippe Pierre, Partner, EU Institutions leader.

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- Stéphane Soulard, Senior Advisor;
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- Eleonora Zoboli, Market Analyst;
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- Priscilla van der Plaats;
- Marlon Mendonca Dias;
- Egle Aleknaviciute;
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7.7 Appendix 7: Literature

7.7.1 Publications

602   AHA (2011), 'AHA Survey on Hospitals' Ability to Meet Meaningful Use Requirements of theMedicare and Medicaid Electronic Health Records Incentive Programs', American Health Association

603   Calliope Network (2010), 'European eHealth Interoperability Roadmap, Final European Progress Report', European Commission

604   Codagnone, C. and F. Lupiañez-Villanueva (2011), 'A composite index for the benchmarking of eHealth Deployment in European acute Hospitals: distilling reality in manageable form for evidence based policy', Institute for Prospective Technological Studies (IPTS) – European Commission's Joint Research Centre (JRC)

605   Deloitte & Ipsos (2011), 'eHealth Benchmarking III, SMART 2009/0022, Final Report', Deloitte & Ipsos, April 2011, Belgium

606   EHR-Impact (2010), 'Interoperable eHealth is Worth it – Securing benefits from Electronic Health Records and ePrescribing', European Commission publication

607   Empirica (2008), 'Benchmarking ICT use among General Practitioners in Europe', European Commission publication

608   European Commission (2006), 'Connected Health: Quality and Safety for European Citizens', Report of the Unit *ICT for Health* in collaboration with the *i2010 sub-group on eHealth*, European Commission

609   European Commission (2006), 'ICT and e-Business in Hospital Activities: ICT adoption and e-business activity in 2006', Sector Report No. 10/2006, European Commission

610   European Commission (2009), 'Commission Recommendation of 2 July 2008 on cross-border interoperability of electronic health record systems: Creating a European coordination network for eHealth interoperability implementation'

611   European Commission (2010), 'Socio-economic impact of interoperable electronic health record and ePrescription systems in Europe', European Commission

612   European Commission, 'Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare', European Commission

613   European Commission, COM (2001) 140, 'Commission Communication of 13 March 2001 on eEurope 2002: Impact and Priorities A communication to the Spring European Council in Stockholm, 23-24 March 2001', European Commission

614   European Commission, COM (2002) 263, 'The *e*Europe 2005 Action Plan: an information society for everyone', European Commission

615   European Commission, COM (2004) 356, 'eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area', European Commission

616   European Commission, COM (2007)630, 'Together for Health: A Strategic Approach for the EU 2008-2013', European Commission

617   European Commission, COM (2007)860, 'A lead market initiative for Europe', European Commission

618   European Commission, COM (2008) 3282, 'Commission Recommendation of 2 July 2008 on cross-border interoperability of electronic health record systems', European Commission

619   European Commission, COM (2010) 245, 'A Digital Agenda for Europe', European Commission

620 European Commission, COM (2010), 'Europe 2020: A strategy for smart, sustainable and inclusive growth', European Commission

621 European Commission, COM (2012) 736, 'eHealth Action Plan 2012-2020 – Innovative healthcare for the 21st century', European Commission

622 European Parliament (1995), 'Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data', European Commission

623 European Parliament (1995), 'Directive 95/46/EC of the European Parliament and the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data', European Parliament

624 European Parliament (2010), 'European Parliament resolution of 21 October 2010 on the future of European standardisation (2010/2051(INI))', European Parliament

625 Gartner (2009), 'eHealth for a Healthier Europe!', Swedish Presidency of the European Union

626 HiMSS (2012), 'A HIMSS G7 Advisory Report. Advancing Global Health IT: A Consultation with the World Bank at HIMSS12', HiMSS

627 Hospital Information Network Europe (HINE) (2004),'European Hospital Market Metrics –2004', HINE

628 ITU-T (2012), 'E-health Standards and Interoperability', ITU-T Technology Watch Report

629 OECD (2013), 'Improving Health Sector Efficiency: The role of Information and Communication Technologies', OECD Health Policy Studies

630 PwC (2010), 'Luxembourg Ministry of Health eHealth Service Platform Study, Final Report', PricewaterhouseCoopers

631 PwC (2012), 'Recommendation report: A best practice based approach to National Contact Point Website: Feasibility Study', PricewaterhouseCoopers

632 Stroetmann, K.A., Jones,T. *et al,* 'eHealth is Worth it. The economic benefits of implemented eHealth solutions at ten European sites', European commission

633 WHO (1998), 'Resolution EB101.R3 on Cross-border Advertising, Promotion and Sale of Medical Products through the Internet',

634 WHO (1998), 'WHO Resolution WHA58.28 on eHealth', the World Health Organization

635 WHO (2008), 'World Health Report 2008', the World Health Organization

636 WHO (2010), 'Atlas, eHealth country profiles– based on the findings of the second global survey on eHealth', Global Observatory for eHealth Series Volume 1, the World Health Organization

637 WHO (2010), 'World Health Report 2010' the World Health Organization

7.7.2 Other online resources

638 Preamble to the Constitution of the World Health Organization:
http://www.who.int/topics/primary_health_care/en

639 Global Observatory for e-Health:
http://www.who.int/kms/initiatives/ehealth/en/

640 European Commission, DG Enterprise and Industry, ICT Standardization Work Programme:
http://ec.europa.eu/enterprise/sectors/ict/standards/work-programme/

641   OECD website:
      http://www.oecd.org/health/healthsystems/benchmarkingofinformationandcommunicationtechnologiesictsi
      nhealthsystems.htm

642   WHO website:
      http://www.who.int/topics/primary_health_care/en

Abstract

The objective of this survey, conducted by PwC Luxembourg in cooperation with GDCC, was to benchmark the level of eHealth use in acute hospitals in all 27 EU Member States and Croatia, Iceland and Norway. The total geographical scope is hereafter referred to as EU27+3. This study builds upon previous studies in the area, most recently the eHealth Benchmarking III study of 20111, hereafter referred to as "the previous study".

The survey targeted the Chief Information Officers (CIOs) of the acute hospitals. We used Computer-Aided Telephone Interviewing (CATI) with native-speaking interviewers. In total, we called 26,550 healthcare establishments within EU27+3. Of the 26,550 establishments, 5,424 qualified as acute care hospitals and of this number, 1,753 hospitals completed the interview.

We analysed the results by hospital size (i.e. number of beds, categorised) and by ownership type (public, private not for profit, private). At a national level, we analysed a number of eHealth take-up indicators and for certain countries, performed an analysis at regional level based on the NUTS2 classification.

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